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How to Avoid Saving Money

by DANNY KAYE





To avoid saving money, the first thing is to cut off all your pockets. (Or throw away your purse and keep your lipstick in your snood.) Thus you will have to carry your money in your hand. Which will insure that you—1. spend it, 2. lose it, 3. get it taken from you—*quicker!*

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Danny Kaye



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HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

TESTIFYING to the extreme light-consciousness of projectionists is the raft of communications received following publication of the details anent the new National Carbon Co. *experimental* "Suprex" 9-mm/8-mm carbon trim which will burn at 90 amperes and 50 volts. We italicize the word "experimental" because this new trim still is just that, and we shouldn't like to have any of our people go off the deep end and attempt to use this trim without the proper equipment therefor.

National Carbon Co. is most emphatic on this point, its preliminary announcement thereon citing frankly the requisites for efficient operation of this trim.

Not a few of the comments relative to this new trim reaching I. P. question the necessity for upping the amperage of the "Suprex" series in view of the existence of that old standby, the 13.6-mm, 125-ampere, high-intensity carbon used with existing condenser-type lamps.

It may surprise many projectionists to learn that the new 9-mm "Suprex" carbon, which will utilize a reflector mirror, will deliver as much, maybe more, of better quality light than does the 13.6-mm, H. I. arc; and that its advantages are so pronounced in this direction that not even the necessity for utilizing some effective cooling means is considered a detriment.

We doubt that the main problem here is the dissipation of the heat at the film aperture, important though this be. In several tests of the 9-mm trim, of which we have personal knowledge, it was the mirror that proved to be the weakest link in the chain. So intense is the heat radiated by this new 9-mm carbon that an ordinary mirror cracked in about 4 minutes time; and it is doubtful whether even a quartz reflector could stand the gaff. This indicates clearly that, in addition to cooling the film at the aperture, some means will have to be devised for cooling the mirror itself.

One such means suggests itself: a continuous air blast directed at the *back* of the mirror. Just such a system was developed and patented some years ago by a projectionist in Ohio, whose name escapes us at the moment. We hope this item comes to his notice.

Water-cooling of the arc itself is another alternative, although this method is at best cumbersome, requires auxiliary equipment which must give positive assurance of a continuous flow of water at a given pressure, and which might not be feasible in smaller theatres.

Whatever the outcome of experiments now under way, it is evident that the projection process, far from being static, is the topic of much serious thought and extensive work by highly competent forces, whose work might well radically alter both projection equipment and technique in the next several years.

As always, Mr. Projectionist must be ready. That decision is his to make.

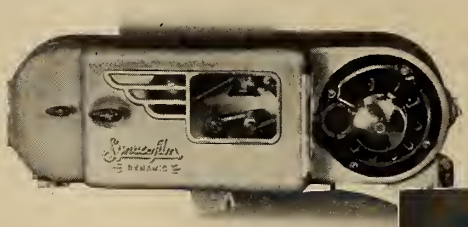
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VOLUME XXII JANUARY 1947 NUMBER 1

Magnetic Recording

By H. E. ROYS

Radio Corporation of America

Magnetic recording, in existence since 1901 when the inventor, Valdemar Poulsen, first used it for recording wireless telegraph signals, has received much publicity recently, and many statements have been made as to its merits and possible replacement of other methods of recording. Here is the what, how and why of this novel process.

MAGNETIC recording has the inherent advantage that only a rearrangement of the magnetic elements occurs during recording, a rearrangement which is not visible but which remains essentially unchanged until subjected to a stronger magnetic force, so that processing (needed by film or wax disk) is not required and therefore immediate playback or reuse of the medium is possible. For these reasons magnetic recording appears attractive for applications where immediate playback is desirable, or where reuse of the medium for other recordings is permissible.

The wire or tape during the recording process is magnetified by a small electromagnet called the "recording head," and the magnetization is in accordance with the amplitude and frequency of the recording current. Usually the direction of magnetization is parallel with the line of travel of the medium—"longitudinal magnetization"—although in some cases where a steel tape is used, the direction of magnetization is directly through the tape—"perpendicular magnetization."

The net result of the longitudinal method may be thought of as a string of tiny magnets laid end to end, with like poles adjacent, where the length of each magnet depends upon the speed with which the medium passes over the recording magnet as well as upon the frequency of the signal being recorded. The strength of each magnet, although depending upon the composition of the medium and other factors, is a direct function of the magnitude of the signal current.

To reproduce this strip of magnets and convert the magnetic energy back into electrical energy, it is passed over another electromagnet called the "reproducing head" Here the varying flux through the coil due to the travel of the tiny permanent magnets across it induces a voltage which is like the original signal voltage.

To obliterate any previous recording and asure uniform results, the medium is first conditioned by passing it over an "erasing head," which is located in front of the recording head. The wire or tape is subjected either to a strong unidirectional magnetizing force which saturates it, or to a varying force which leaves it unmagnetized. The frequency of the varying force is well above the audible range (20 to 30 kilocycles or higher), and the use of such a high frequency has resulted in the procedure being called the "high-frequency" method of recording; whereas the use of direct current is known as the "d.c." method.

At the recording head, a magnetic "biasing" force is applied in addition to the magnetic force of the recorded signal. The correct bias in magnetic recording is just as important as the correct grid bias for the amplifier tubes in a film recording amplifier. If d.c. erasing is used, a d.c. biasing force of opposite polarity, but much less in magnitude, is required; and if high-frequency erasing is used, a varying magnetic biasing force of less magnitude and usually of the same frequency is applied.

The high-frequency method of recording is widely used today because of the improvements resulting in less noise and distortion. The d.c. method was the first to be used, although the high-frequency method has been known for a long time, as patent information shows that Carpenter and Carlson used it before 1921.

A simple explanation of the action of the high-frequency bias sometimes used is that the varying force agitates the magnetic elements so that they are more easily acted upon and oriented into a position consistent with the direction and magnitude of the force executed by the relatively slowly varying signal magnetomotive force. For a mechanical analogue, this action might be compared

with that of obtaining a meter reading with a pointer that sticks by tapping gently on the case in order to break up the static friction.

The range of frequencies that can be covered depends largely upon the velocity of the medium past the recording heads. For, as in film recording, a higher velocity results in longer recorded wavelengths, with an accompanying improvement in scanning and high-frequency output. Recordings are usually made with constant current through the recording coil, which subjects the recording medium to a constant magnetomotive force. This corresponds to the constant amplitude method used in variable-area film recording.

Frequency Response

In reproduction, however, the magnetic head develops a voltage proportional to the time rate of change of flux through the coil. As a result, the output voltage for a constant amplitude magnetic recording varies directly with frequency, increasing as the frequency increases.

The increase is not maintained with the higher frequencies largely because of the loss in magnetization due to the high reluctance of the return path through air after the medium leaves the recording head, and due to the demagnetizatizing effect of the leakage flux at the recording pole piece. As a result, a typical frequency response curve for a tape speed of 8 inches a second shows an increase in response with frequency up to about 1500 cycles, and then a rapid decrease. In order to obtain a flat frequency response, electrical compensation in the playback system is required.

Recording and reproduction is usually accomplished with the same head although separate heads may be used. The head may consist of one or two separate pole pieces, or it may be the present popular "ring" type which contacts the medium along one side and has one or more air gaps, across one of which recording or reproduction takes place.

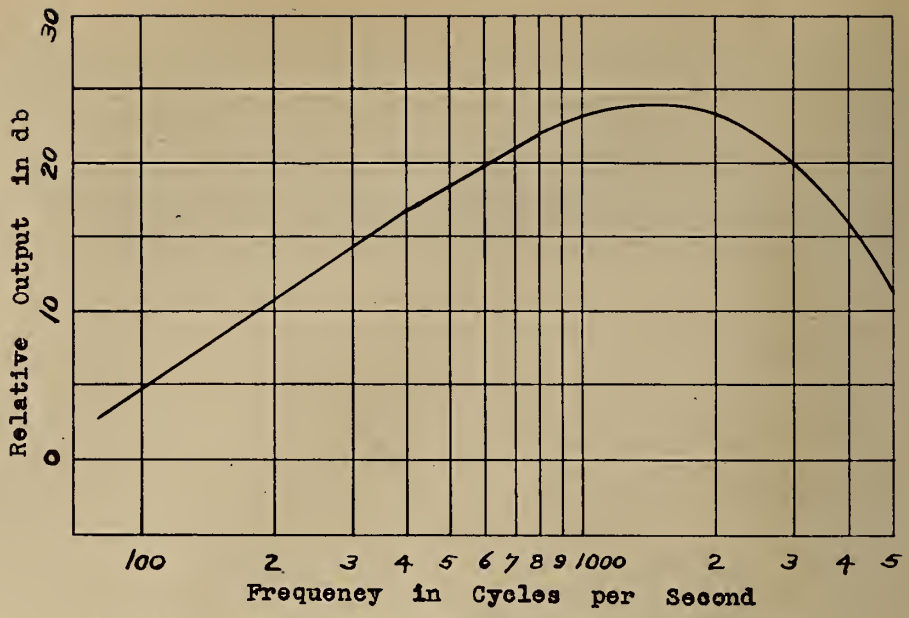


FIGURE 2. Unequalized frequency response for tape at 8 inches per second.

Work hardened steel wire of low carbon content, commonly called music wire (because of its use for piano strings) was one of the first mediums used for magnetic recording. It still is in use today, due to its low cost, availability, and the fact that acceptable results can be obtained. The permanent magnet qualities of carbon steel are poor compared with tungsten, chrome or cobalt steels, and as a result, a magnet length many times the diameter or cross-sectional dimensions is necessary to obtain a strong magnet.

Good permanent magnet materials are usually hard and brittle, and much work has been done to obtain a material with the desired magnetic properties which can be drawn or rolled to the desired small cross-section and will be flexible enough to permit bending about the small pulleys and reels used in recorders.

Tungsten and chromium, which improve the permanent magnet qualities of steel, have been successfully used in commercial tapes. A recently developed alloy called "vicalloy" has given excellent results. Stainless steel wire of improved permanent qualities has become available and recently a soft brass wire plated with a nickel cobalt alloy has been introduced for magnetic recording purposes.

Tape in which a dispersion of fine magnetic particles in a suitable binder is coated on a base of either paper or plastic material has been developed in this country and in Europe, simultaneously but independently. Low noise and useful output voltage at high frequencies (for a given linear speed) is claimed for this new product.

Various Applications

Since magnetic recording allows immediate playback, produces no shavings, requires little operating skill, and permits reuse of the medium, it is an ideal system for home recording. There is no waste of medium due to an unsatisfactory or unwanted recording—the wire or tape is simply recorded over again.

These features, immediate playback and reuse, make it attractive commercially for original recordings to be later rerecorded to the final medium as required for printing and duplicating, or where the recording does not have to be kept permanently. The recording may be monitored directly with a playback head located adjacent to the recording head and only a fraction of a second behind the recording. Tape may be cut and spliced or portions blanked out or rerecorded. In these respects it is much like film except that the sound track is not visible: it must be played in order to determine whether or not a recording exists.

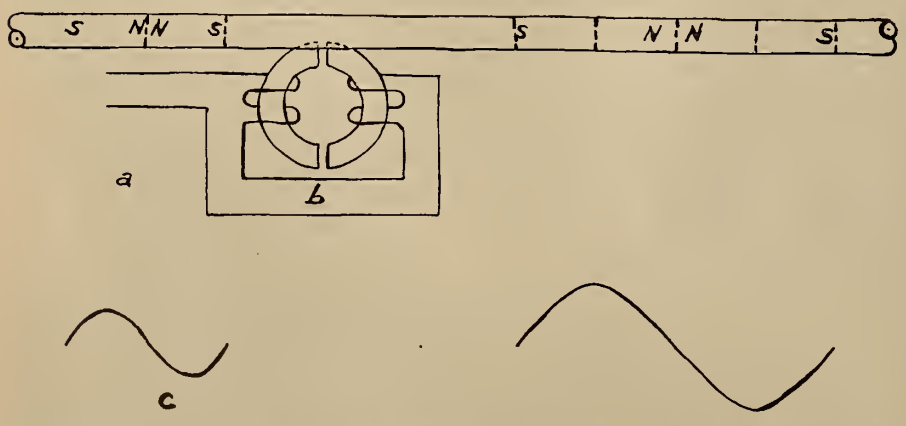


FIGURE 1. (a): Illustrating the analagous magnet arrangement in a wire recorded at two different frequencies; (b) ring type reproducer; (c) flux variation in the wire.



This shot is from *The Great Train Robbery* produced in 1903 by Edwin S. Porter — the film that introduced the technique of the "close-up" to the screen.



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What COLOR-CORRECTION Means

By ALLEN E. MURRAY
Scientific Bureau
Bausch & Lomb Optical Company

COLOR-CORRECTION in lenses is not a new wrinkle introduced as a consequence of the growing popularity of color film. Lens designers and opticians have been laboring over the color-corrections since the first lenses were assembled into optical systems. The term "color-corrected" is not so profound that, like "abracadabra" or "open sesame," it should become a conjurer's word to call up the perfect lens. "Color-corrected" to the optical designer and optician has a very definite meaning, much as it may have been corrupted to include application to almost any type of lens. A color-corrected lens, in the language of the designer, is one satisfying two rather stringent specifications, and no lens failing to fulfill these two requirements can fairly be called "fully color-corrected."

Historically, unwanted color in images was recognized very early, and constituted one of the first challenges to the lens designer's skill. The researches aimed at discovering the whys and wherefores of this annoying color led to a better understanding of lenses in general, and to new glasses, and even today are not completed.

The state of the color-corrections in a lens system is fundamental in the performance of the system and constitutes one of the first considerations in design. The subject is rather complicated, as there are in reality two distinct color aberrations the designer must eliminate before he is entitled to say that his system is color-corrected.

The Behavior of Light

But before we undertake to amplify this statement, we must refresh our memories with a few facts of how light behaves.

Light travels in vacuum at the astounding rate of 186,000 miles per second: that is, *all* light is conjectured to do so—blue, yellow, red, infra-red, *etc.*—it all skips merrily along at this dizzy rate in empty space. But something happens to this light when it reaches a region filled with a more tangible substance. What happens is exactly the same thing that occurs when a train hits a snow bank, or a football player enters a broken field—a reduction of speed. At the boundary of the optically denser medium, the light beam is bent, or refracted, if the angle at which the beam hits the denser medium is other than 90°.

Specifically, as Fig. 1 shows, on entering a medium in which the speed is less the beam of light is bent toward the normal, an imaginary line perpendicular to the surface. The reverse is true on leaving.

The crux of the color effects is that in spite of the fact that all colors are transmitted through empty space with the same velocity, they insist on being

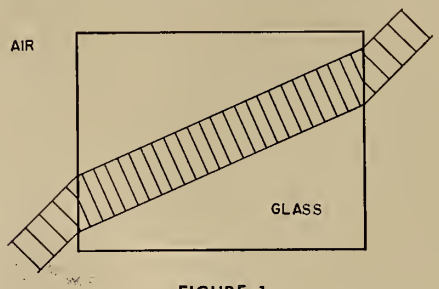


FIGURE 1

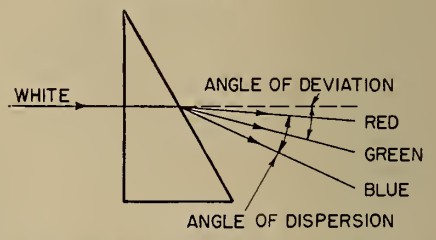
treated differently when traveling through ponderable matter. In glass, for instance, red light will travel about 3,000 miles per second *faster* than blue light. This speed differential has as its consequence the greater bending of blue light over red light, causing the dispersion shown in Fig. 2.

Achromatic Lens Combinations

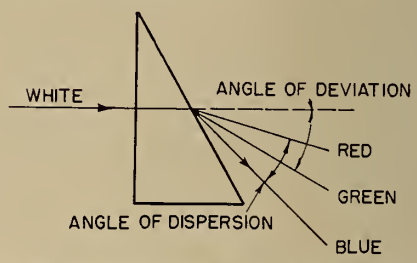
In the design and manufacture of photographic objectives, several different types of glass are used whose basic action is illustrated in Fig. 2. One type is of low index of refraction, *i.e.*, it retards light little in passage. This glass, in general, will retard the blue only slightly more than the red. At the other extreme are the glasses of high index, in which the velocity of light is lower, and this in turn means a greater angle of deviation whereby the blue is affected much more than the red, so that the angular dispersion is greater.

Sir Isaac Newton, who founded much of optics as we now know it, from his extensive experience with the glass prisms of his day, concluded, erroneously, that dispersion is always proportional to the deviation and that, as a consequence, achromatic combinations are impossible. Sir Isaac committed one of his rare mistakes in concluding that achromats are impossible and that the reflecting telescope is the best answer to the color problem. Not long after Newton's death, the first achromats were made in England by combining a

FIGURE 2

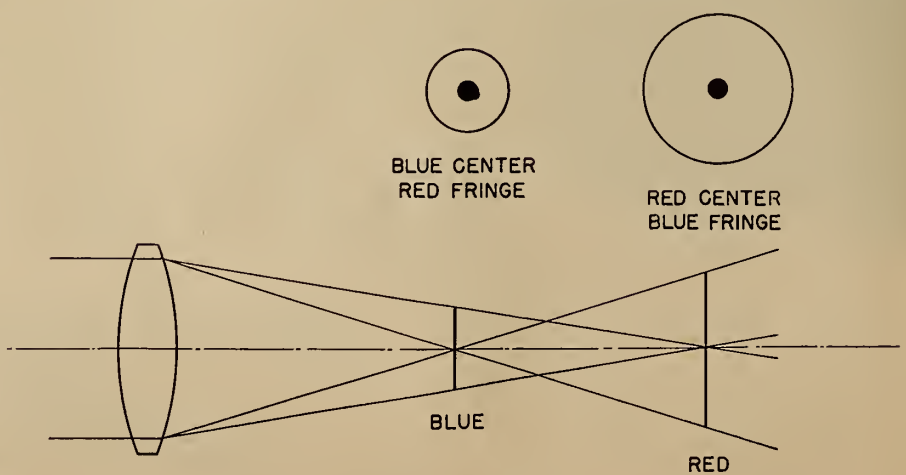


White light entering material of low refractive index.



White light entering material of high refractive index, at the same angle as above.

FIGURE 3



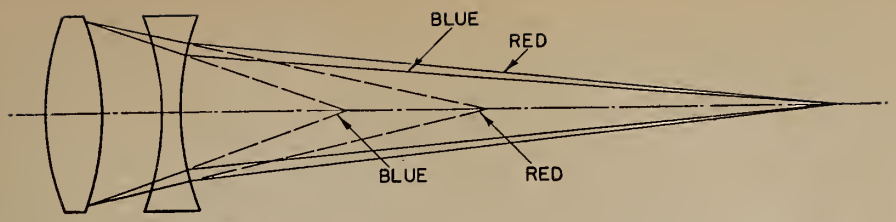


FIGURE 4

positive crown and negative flint lens to produce the basic type of achromatic doublet.

We have seen in Fig. 2 that a ray of light, upon passage through a prism, is bent, or deviated, in the direction of the base. This is essentially the fundamental reason for the action of lenses of all kinds. The curved surfaces act like an assembly of an infinite number of small prisms, deviating each ray striking the surfaces sufficiently to bring it to a reunion, real or virtual, with the other rays forming the image. A positive lens will *converge* parallel rays to a real focus; while a negative lens will *diverge* parallel rays, making them act as if they came from a point, the virtual focus.

From what was said previously concerning dispersion, it is apparent that *any simple lens cannot have one definite, fixed focal point for all light.* Since the light-bending power, or refractivity, of glass is greater for blue than for the red, the blue light will focus at a point nearer the lens than the red. This situation is illustrated in Fig. 3. This is the simplest and most readily grasped type of chromatic aberration, and usually the first corrected.

In practice, this longitudinal chromatic aberration will mean that there is no one focal point on the axis but several, depending on the color of the light used. A photograph made with a simple positive lens would show a large shift from visual focus to photographic, even with panchromatic negative material. The "chemical focus" of the old-time photographers was of this nature.

Axial Chromatism Correction

A perfect lens cannot be made, and even in the best lenses there remains a very small residual of this aberration, so that when a color-blind emulsion responding only to the blue is used, a shift towards the lens is usually necessary—the so-called "chemical focus." This effect is familiar also to those who have used infra-red sensitive emulsions in their cameras: for best results, it is usually necessary to rack the lens *out* a trifle.

A further result of this irresolution of focal points is the situation shown in Fig. 3, where at the blue focus the red rays create a red disc, and at the red focus the blue rays create a blue halo. A point object could hardly be photographed as a point under these conditions.

This axial chromatism is not difficult to correct and, as noted before, is given high priority. The secret lies in the relation of dispersion to deviation. Consider for a moment a simple positive lens as shown in Fig. 3. The marginal rays have been deviated toward a focus, and at the same time because of the dispersion of the glass, the red and blue rays are aimed at different points on the axis.

Now, everything would be perfect if there existed an optical material with a given amount of dispersion and no refractive power, for then correction could be effected with a plane parallel sheet of this wonderful material. Actually, the only practical material for this task is a glass which has a fortuitous relationship of refractivity to dispersion such that the dispersion will effectively cancel that of the positive lens. The lens component effecting this achromatism is negative, as shown in Fig. 4, and must have higher refractivity and dispersion than its positive mate.

This combination, then, will bring light of any two colors to a common focus on the axis. The other colors will focus at points practically identical with the chosen colors. Thus this lens would give a color-free star image on the axis.

Other Chromatic Aberration

The other type of chromatic aberration is a bit more difficult to understand. It is somewhat more complicated both to explain and to show in a drawing. Some of us may recall mention in our reading concerning optics of certain things called "cardinal points," "ideal planes," *etc.* These points and planes are convenient ways of describing the properties of lens systems and are indispensible to the lens designer. Briefly, these cardinal points can be looked on as points on the lens axis at which the refractive

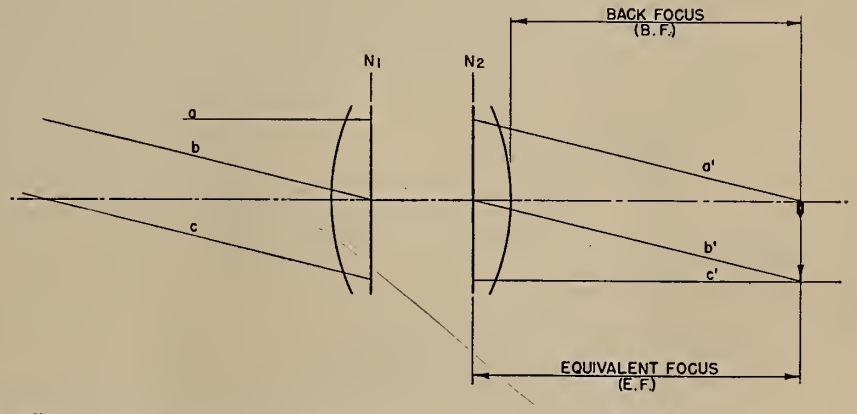
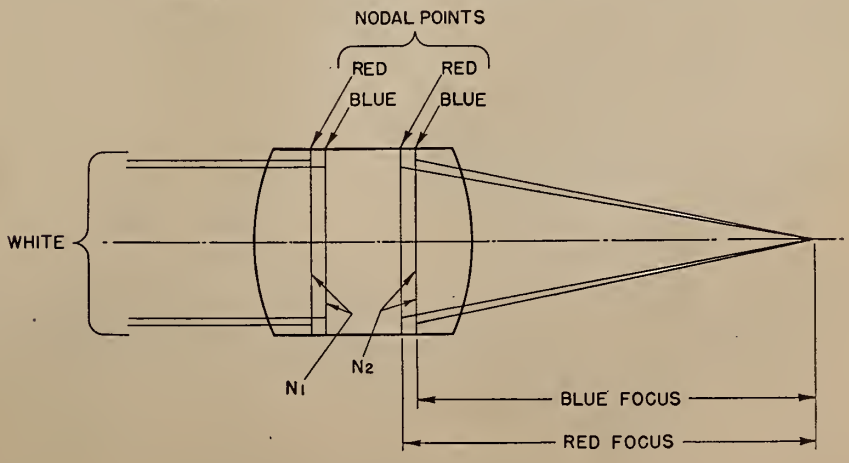


FIGURE 5

powers of the lenses or lens system are concentrated. The cardinal points and planes are exceedingly useful because they simplify computations by replacing a complex, almost unmanageable system by points at which all the refraction can be considered to occur, or more graphically, by thin lenses whose laws are simple and easy to handle.

Irrespective of the distance from the

FIGURE 6



rear surface of the lens to the focal point in parallel light [B.F.] the equivalent focal length [E.F.] of a lens is defined as the distance from the second nodal point (cardinal point) to the second principal focal point [see Fig. 5].

We are all familiar with the fact that even with infinitely distant objects the image size is proportional to the focal length of the lens used. The 50-mm lens on miniature cameras will yield an image one-third the size of that formed by a 6-inch lens.

Now, it is a most unfortunate fact that the cardinal points have positions dependent on the refractive index of the glass comprising the lens. Expressed in other words, each color has its own cardinal points which can be distinct from those of any other color. Now, if the lens is color-corrected axially, *i.e.*, if the red and blue colors unite in one focal point on the axis, and if the nodal points in the two colors are different, automatically the lens must have different focal lengths in the two colors. This is shown in Fig. 6.

However, these different focal lengths, as we saw previously, mean differently sized images: that is to say, the magnification will be different, depending on the color [see Fig. 7]. It is for this reason that this second type of chromatism is spoken of as chromatic difference of magnification, or lateral color.

Lateral Color Aberration

In a lens afflicted with this aberration the points in the margin of field are drawn into spectra, or rainbows. This particular aberration is most annoying even with black-and-white film, for it quickly sets the limit of usable field by producing a graded soft focus near the margins.

In the correction of this aberration, advantage is taken of the fact that some lens systems will give a spectrum with the red end closer to the axis; while others will give a rainbow oriented the other way around. In the correction of lateral color, then, systems of these opposing characteristics are balanced against each other until a satisfactory compromise is found.

We have now seen the two types of pure chromatic aberration, longitudinal chromatic aberration, and chromatic difference of magnification. The former, the simpler type, is manifested by the absence of one single focal point for all colors, with the existence of a distant point for each separate color. This is a very troublesome aberration and is corrected in all but the most inexpensive lenses. These lenses can be spoken of as being "color-corrected" only to the extent that there is little or no shift of focal point with color.

This aberration is in theory independent of the aperture of the lens, though in practice its effects will be mitigated by stopping-down, for then the effective depth of focus is increased and the image is less sensitive to improper focus. Longitudinal chromatic aberration is corrected by combining a positive lens with a negative lens of higher refractive index and dispersion and of such power that the dispersion of the positive lens is annulled, but its convergence not cancelled, so that a union of the red and blue colors occurs on the axis.

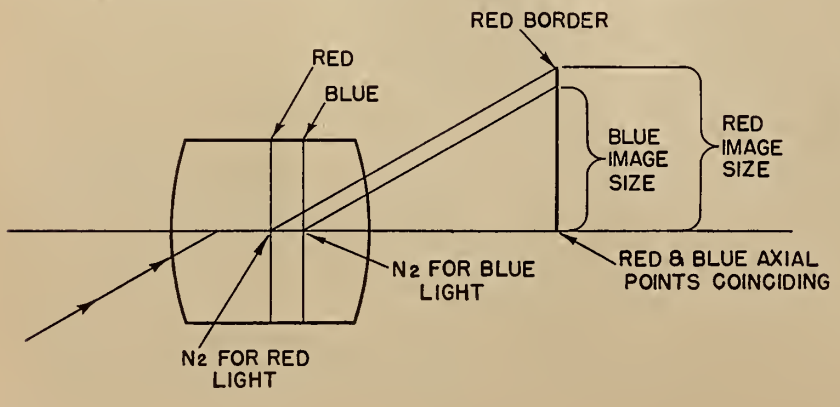
The second chromatic aberration is more complex and manifests itself in differently sized images in different colors. This chromatic difference of magnification is troublesome even in black-and-white photography, and the best lenses are corrected for this aberration. Only the photographic objectives designed with this aberration pared to tolerable limits can be spoken of as "fully color-corrected." This aberration is proportional to the image height, thus becoming worse toward the corners of the picture. Stopping-down the lens is without effect on this aberration. It can be corrected by employing combinations of elements of opposing tendencies, so that one set cancels the effects of the preceding.

The corrected lenses of the reputable makers have all been designed with this aberration in mind and can justly be spoken of as being fully color-corrected. However, it is well to remember that nothing perfect is manufactured, and that with the most refined tests it might be possible to demonstrate some lateral color with the most nearly perfect lens made. This would be without significance, however, since the test necessarily would be artificial and would not correspond to the conditions of use of the lens. If the longitudinal chromatic aberration has been corrected, and if the lateral aberration cannot be detected on the film, then for all practical purposes the lens is "fully corrected."

Full color-correction is as essential in the best photography and projection with black-and-white emulsions as it is with color film. The effect of lateral color in the case of the former is to create a soft focus effect toward the margins, while with color film registration difficulties are the consequence of this aberration.

Color photography and projection has introduced no new element into the design of good objectives. With color film the color aberrations, particularly lateral color, become visible as color defects. The best lenses have always been fully color-corrected.

FIGURE 7



Greatly Expanded SMPE Program Results in Dues Rise

To provide finances for many new and essential projects covering technical problems of production, distribution and exhibition, the Society of Motion Picture Engineers is launching a campaign for additional revenue through slight increases in membership dues and subscription to the monthly *Journal*.

Special effort also will be made to obtain a more equitable portion of financial and personnel support from the motion picture industry proper—the producers, distributors and exhibitors—which at present is contributing only about 25% of the dues collected by the S.M.P.E. although it derives the greatest benefits from the research, technical developments, standardization activities and other work done by the engineers.

Though it costs the Society an average of $14.27 per member-subscriber to operate each year, dues for Associate Members, who make up the largest body, have been only $7.50 a year. The Society also has a Student Membership, for registered students in engineering, which has been available for $3 a year. All members receive a copy of the monthly *Journal*, which in itself costs $4.61 per member annually to publish and mail.

Starting January 1, 1947, dues for Associate Members will be $10 annually, while student memberships will cost $5. Subscription to the Journal, for non-members, is being increased from $8 to $10 annually, with single copies costing $1.25 instead of $1.

With a present membership close to 2,500, of which nearly 500 joined in the past year alone, it will be necessary to obtain additional support from the industry in order to carry out the Society's plans for greater service to the industry.

Natco South American Distributor

Natco 16-mm sound projection equipment will be handled in Central and South American territories exclusively by Bellows, Schausser & Co., Inc., of N. Y. City. Personal supervision by Robert Schausser.



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"There's A Branch Near You"

Incandescent LAMPS for Film PROJECTION

By J. J. A. MANDERS

Research Laboratory, Philips Incandescent Lamp Company, Eindhoven, Holland

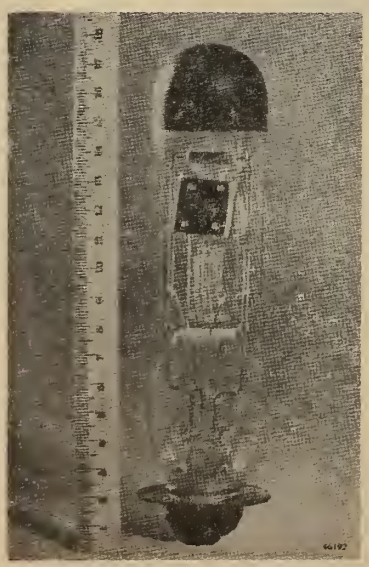
The third and final article in a series which covered comprehensively the requirements which have to be met in order to attain maximum efficiency with incandescent film projection lamps. Invaluable data for every professional projectionist.

THE requirement mentioned previously, that it must be possible to place the filament as close as possible to the condenser, leads to the fact that the envelope, usually of a tubular form, must be given as small a diameter as possible. A limit is set by the fact that the wall of the envelope would become too hot if it were too close to the incandescent filament. This can also be enhanced by the blackening which normally appears after the course of time on the wall due to the evaporated tungsten, which is deposited on the wall and which absorbs part of the radiation and thus makes the envelope still hotter.

Three methods are available for arriving at a small diameter of the envelope. In the first place, the envelope is made of a special hard glass which has a very high softening point, namely 750° K. Second, especially in projectors for 8- and 16-mm film, a forced cooling is employed by means of a fan. Third, attempts are made to prevent the deposition of the evaporated tungsten on the wall in the neighborhood of the filament. This is indeed desirable in any case because the blackening is accompanied by a gradually increasing reduction of the light during the lifetime of the lamp.

The gas with which the lamp is filled plays an important part in these phenomena. While on the one hand it has the disadvantage that it becomes warm itself by heat conduction from the filament and therefore heats the envelope more strongly, on the other hand it has a favorable effect as far as the blackening is concerned, because of the fact that currents occur in the heated gas which carry the evaporated tungsten along, so that most of it is not deposited close to the filament but at some other spot.

FIGURE 9. Philips 16-mm film lamp, 110 V, 1000 W. Above the filament are two nickel plates along which the rising gas flows and upon which the particles of evaporated tungsten have an opportunity to be deposited. The upper part of the envelope is sprayed black in order to prevent light escaping through the ventilation holes of the projector into the auditorium.



This effect can be reinforced by introducing nickel gauzes or plates above the filament in the rising gas current, upon which the tungsten particles are deposited (see Fig. 9 . In this way it has been possible to limit the diameter of the envelope of lamps for 8- and 16-mm film for 1000 and 1200 watts to the same as that for a 750-watt lamp, namely only 38 mm.

Still more effective is the employment of the so-called hanging construction (Fig. 10). The lead wires, in this case above the filament, which become very hot close to the filament, function as a sort of chimney, which causes the rising current of gas to pass first along the axis of the lamp.

In the spherical enlargement at the top of the envelope the gas takes on a whirling motion in which practically all of the tungsten carried with it has the opportunity of being deposited on the wall at that spot. The descending, cooled gas, in which there are only few tungsten particles left, deviates from the wall again slightly above the filament and flows toward the filament (Fig. 11). Therefore, at the height of the filament the wall remains almost entirely free of blackening, while also there is no heating of the wall here by passing hot gases.

In this way in the case of the 750-watt lamp shown in Fig. 10, which had to operate without artificial cooling, the diameter could be reduced to almost the same value (44 mm) as in the case of the aforementioned lamps with forced cooling.

[The gas currents described can be made visible in a very interesting way by constructing such a lamp with a tube fused on, through which, while the lamp is burning, a small amount of air can be admitted to the lamp. The tungsten particles coming from the filament are then immediately oxidized to a white powder whose motion can be followed with the eye.

[The well-known method of Toepler can also be followed, in which the current phenomena are made visible by means of the accompanying very slight local variations in the index of refraction. These methods are very useful in the investigation of the shape of envelope which is most suitable for obtaining the desired course of the currents of gas.]

In still another way the gas helps in protecting the envelope. If, due to an incipient blackening or possible insufficient cooling, the envelope should become soft at a certain spot, then at that spot it would be slightly compressed by the external pressure if there was a vacuum or diminished pressure inside the lamp. It would thus come nearer the filament and become still hotter and still softer, and this accelerated process would quickly lead to the destruction of the lamp.

Now, by filling the lamp with a gas at such a pressure that when hot there is a slight excess pressure in the lamp, the compression of the envelope is made impossible. The excess pressure can be employed without any danger because of the small size and thus the strength of the envelope. The relatively high pressure gives the additional advantage of a still greater increase in the permissible working temperature and an in-

FIGURE 10. Two Philips cinema lamps 15 V, 750 W, with the so-called hanging construction. The left-hand lamp has an auxiliary mirror of evaporated aluminum on the inside of the envelope.



crease in the breakdown voltage in the gas.

Finally, it may be mentioned that for some 8- or 16-mm film projectors, with a very compact construction, lamps have been made in which the filament is brought especially close to the wall by excentric placing in the envelope. In the case of the 400-watt lamp shown in Fig. 12, for example, the distance between filament and wall is only 7 mm.

This is made possible by the employment of the hanging construction and by an arrangement for cooling in the projector housing in such a way that the part of the envelope lying opposite the filament is the most strongly cooled.

For the rest, it is striking that in this lamp the spiral sections are horizontal. The vertical position is usually chosen in order to prevent short circuit between the sections in case of any slight sagging of the spiral during use. The horizontal position has the advantage that the light emitted in the axes of the envelope can easily be used for the scanning of the sound track of the film, so that a separate lamp is not needed for that purpos.e.

In the case of the lamp in Fig. 12, use is made of this possibility, which exists indeed only with the hanging construction, since in the ordinary, standing construction the light along the axis direction would have to pass through the upper parts of the envelope, which are most subject to blackening.

Although in projectors for 35-mm film the dimensions of the apparatus are much less critical than in the case of narrower film, here also for other reasons the diameter of the envelope must be kept as small as possible. Since in general these projectors work with a mirror condenser, the auxiliary mirror is placed in front of the lamp and thus cuts off a part of the beam of light which the condenser mirror throws on the film.

The auxiliary mirror should therefore be small, and since the mirror is placed on or outside the envelope, the envelope itself must be small.

Attempts have indeed been made to avoid this necessity by placing a very small mirror inside the envelope very close to the filament. This mirror had to be made of molybdenum because of the intense heat. The relatively low coefficient of reflection of molybdenum (60 per cent in the cold state, about 75 per cent at white heat, compared with 95 per cent for a mirror of aluminum deposited on the wall) and the practically unavoidable loss of adjustment upon becoming hot, however, make the advantage of this method more or less illusory, especially since the hanging construction has made it possible to reduce the diameter of the envelope very much at the position of the auxiliary mirror (in the lamp of Fig. 10, left, it amounts to only 60 mm.)

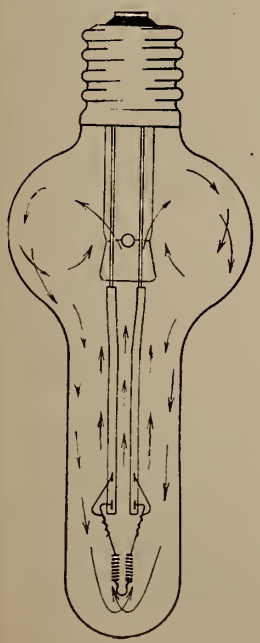


FIGURE 11.

Gas current in the lamps af Figure 10.

Operating Characteristics

We have already pointed out that the lamp must be resistant to the mechanical vibrations to which it is exposed when the projector is in use. These vibrations are composed of many components of different frequencies and are different for each type of projector.

It is therefore impossible to indicate a lamp construction which could be used in all cases. Attempts are rather made empirically during the development of the lamps to render a lamp insensitive to the special vibrations of the type of projector for which it is intended.

For this purpose the lifetime is determined of test models of the lamp and a normally working model of the projector, and the construction of the leads and hooks are altered until the desired lifetime in operation is fully achieved. This work is made more difficult by the requirement that the leads and hooks must not stand in the way of the light beams which the filament emits towards the condenser and auxiliary mirror.

The nominal lifetime can only be attained if the lamp is burned precisely at the prescribed voltage or current. If the lamp is calculated for a certain voltage, an increase in voltage of 1 per cent decreases the lifetime by 14 per cent; while on the other hand a decrease in voltage of 1 per cent causes a decrease in brightness of 4 per cent.

With a lamp for a certain current the corresponding variations upon change in current are still larger, namely 25 per cent in lifetime and 8 per cent in brightness.

The difference between the two kinds of lamps consists in the fact that, in

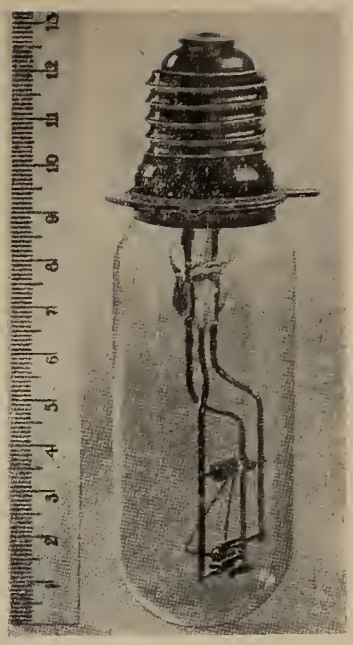


FIGURE 12. Philips 16-mm film lamp 30 V, 400 W, with hanging canstructian and with excentrically placed filament, whereby the distance between filament and wall of the envelope is reduced ta 7-mm. The spiral sections are harizontal in this case, the light emitted downward is used for scanning the sound track af the film. The sectians af the spiral do nat lie in a flat plane but in a cylindrically bent plane, whereby a similar effect is obtained as in the two-plane assembly.

choosing the dimensions of the former, account is taken of a gradually decreasing current strength during the life of the lamp, due to the fact that the filament is becoming thinner by evaporation, and a consequently increasing resistance; in the case of the second lamp a gradually increasing voltage is discounted in the dimensions for the same reason.

Since, as a result of this, the brightness will decrease slightly in the first lamp and increase in the second lamp, the use of lamps for constant current is always considered desirable for projectors in order to compensate for a decrease in light due to blackening of the walls and deformation of the filament.

Since, however, according to the foregoing in the Philips lamps this decrease in light yield has been reduced to practically zero, the burning of the lamp at constant voltage would be more recommendable in connection with the aforementioned slighter sensitivity to variations in the operating condition, and also because the "gain in light upon the ageing of the lamps for constant current is of course only obtained at the expense of a lower temperature of incandescence and brightness in the new lamp.

In any case the voltage or current stamped on each lamp should be exactly maintained during its use if full profit is to be had with respect to brightness and

lifetime. Most projectors are provided with a measuring instrument (although it is unfortunately not always reliable) for controlling voltage or current.

Lamp Overall Efficiency

A few words may be said about the efficiency of the lamps. It is very high, thanks to the high temperature of incandescence. The lamps with a life time of 25 hours have as a rule a specific light yield of 25 lm/W, (lumens per watt), the 1200 W lamp with a 10-hour life-time even has more than 30 lm/W, which begins to approach the efficiency obtained with gas-discharge lamps.

If one considers the unusually uneconomical way in which the light is used in the projector, the high efficiency mentioned appears to be a waste of effort. A balance of the light flux excited in the lamp for different projectors shows that in the end a maximum of only 1 to 2 per cent of it reaches the screen as effective light.

Nevertheless, the high light yield of the lamp is of very great practical advantage, not so much because of the lower current costs—these are negligible compared with the cost of the film—but because of the smaller amount of heat developed. This by-product must be removed from the projector without the occurrence of undesired high temperatures at any spot, and in particular the heat contribution from the radiation which must be concentrated on the film window may not cause at that spot too great overheating.

This heating is indeed not so dangerous in the case of film of non-inflammable material, and it is less intense in the case of the lens condenser used for narrow film than with a mirror condenser, since due to the dispersion in the glass the lens has the fortunate property of focussing the infra red rays to an image of the filament considerably farther away.

On the other hand, however, in the case of just these narrow film apparatus every limitation of the heat developed is welcome in order to be able to reach a reasonable light production and still retain a small and convenient construction.

THE END

STRATOSPHERE ROAD-MAPPING CAMERA

Motion picture cameras which will be able to road-map the stratosphere at rocket and jet speeds are being blue-printed for the Army Air Corps, according to a paper presented at the last convention of the Society of Motion Picture Engineers. Aerial cameras of the future must be able to stop the effects of supersonic speeds and be carried in rocket or projectile as well as aircraft.

A camera of tomorrow, based on the present S-7 continuous strip camera, will provide color pictures which will divulge the product of a manufacturing plant by its smoke, residue or raw products. This camera will chart the heights and depths of the world in color. There exists now a camera for jet-propelled aircraft which, when used almost six miles up, can take a picture covering 100 square miles on one exposure.

Another camera described was stereoscopic in type and provides an exposure 200 feet long by nine inches wide without a break in continuity. Used to photograph the beaches at Okinawa and around Normandy, the resultant color exposures proved invaluable in charting the invasions there. While the entire photographic industry may be proud of these cameras, they are simply crude, experimental models of tomorrow's photographic equipment, it was forecast.

The New RCA Duo-Cone Loudspeaker

TRUE reproduction of sounds varying in frequency from the lowest note on the standard piano keyboard to the highest tone audible to the human ear is possible through a new double-cone, high-fidelity loudspeaker developed by Dr. H. F. Olson and J. Preston of the RCA Laboratories. This wide-frequency, low-distortion speaker affords peak quality performance for every type of reproduction work.

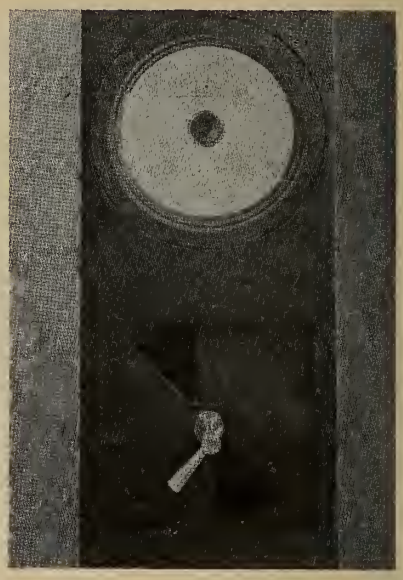
The new unit consists of a 15-inch low-frequency cone and a 2-inch high-frequency cone combined in such a way that the larger cone is a continuation of the smaller one. The low-frequency cone functions in the frequency band from 30 to about 7000 cycles; its smaller counterpart comes into action at about 500 cycles and continues through the audible range to approximately 15,000 cycles.

To facilitate this accentuation of low-frequency sounds, when desirable, the speaker cabinet has an adjustable port or opening in the front near the base. Sound issuing from this port gives the effect of deepening the "voice" of the loudspeaker.

The directional pattern of a loud speaker, like that of a searchlight, has a great deal to do with the efficiency of its projection. Directional characteristics vary with both the frequency of the reproduced sound and the angle of the cone.

Common Distortion Source

At the low frequencies, where the dimensions of the cone are small in comparison with the wave-lengths of the sound, the pattern of radiation is comparatively even over an angle of 180 degrees. When the wave-length and cone dimensions are approximately equal, however, a directional pattern appears, and as the sound increases in pitch the directional pattern becomes progressively narrower.



Duo-Cone speaker unit installed in cabinet with variable opening near base for adjustment of low frequency response.

Since it was intended that the directional characteristics of the new RCA speaker should be practically independent of sound frequencies up to 15,000 cycles, over an angle of at least 90 degrees, it was found necessary to use relatively wide-angle cones, despite the acoustical advantages inherent in narrower cones.

A common source of speaker distortion is the vibrating surface of the cone, particularly in the range between 100 and 1000 cycles where the maximum power in both speech and music is contained. These seemingly conflicting factors were reconciled by selecting material for the duo-cone that is more than twice as thick as that used in the conventional cone.

Two-Unit Shortcomings

The undesirable qualities associated with other two-unit speakers under investigation are interesting in relation to the advantages of the improved type. The simplest design, for instance, consisted of a small cone and a large cone mounted one above the other on the face of a flat baffle. This construction resulted in a poor directional pattern in one part of the frequency band.

Comparative tests of this and other types of two-unit speakers indicate that the adopted design is superior to the others in such important respects as uniformity of sound output, frequency fidelity, directional characteristics, freedom from distortion, and sensitivity to sharp variations in volume.

Presenting: Fred J. Loakes

INFILTRATION, that's what it is, when studio guys grab space herein after what we exhibitionists—pardon, theatre people—have to endure in the form of bum prints and . . . aw, let it go. Anyhow, our jobs are safe because fellows like Chamberlin and Loakes and McCormick and others of that stripe are strictly projection-on-the-level addicts—and that's levelling. *Who* wants new aperture dimensions?

Loakes, Fred J., is the guy whose likeness (*he* says) adorns this section. The rap against him as a sub-sub-L. A. booster (you know, like B for Barrows and, er, Boston) is mitigated by the fact that he was born in Cleveland oh, so many years ago. After leaving school Freddie took a course in electricity (as though anybody can learn *anything* in Cleveland—Vic Welman won't be East for awhile) and wound up with the American Steel and Wire Co.

The boys "struck" this outfit in 1919, and Freddie still is out. He recalls that labor unions were pretty rugged in 1919. Guess he must wear dark glasses around Hollywood today to avoid seeing "rugged" stuff. Freddie scrammed West via the Kansas wheat fields—Hoxie was the town—pretty stern stuff for a city guy, quite apart from the I.W.W. outfit which was also a bit rugged.

Influenced Insurance Rates

This treasonable Loakes guy now has the temerity to say that Los Angeles didn't impress him at first sight: he just stayed on because he was broke. Brother! wait until those Southern Cals read this. Anyhow, Freddie wired a few houses in L. A., which efforts were reflected in a soaring fire insurance rate, and then joined Pacific Tel. & Tel. as a central office and P. B. X. installer and thus learned plenty about circuits, relays and such stuff. In 1926 Freddie heard about motion pictures and, thinking to work "extra," he grabbed a license and went to work on some Main Street or other on one of those long grinds.

Local 150 beckoned in 1929, and Freddie went to work at Pathe, Culver City. With sound coming in, the workday ran from 8 a. m. one day to 2 a. m. the next, seven days a week. Even at the then prevailing scale the dough was big—and so was the body ache. Fred then hit the "brackets" as chief projectionist at the old Tiffany Studios on Sunset Boulevard, remaining there until 1933—a tough year for dear old I. A. in the studios.

Freddie free-lanced (meaning he grabbed jobs here, there and everywhere) for the next couple years, including several studios and theatre work for Local 150. Studio projectionists were taken over by Local 37, but after a hard fight a separate charter was issued which turned out to be Local 165. Freddie is a charter member of Local 165 and one of its first executive board members.

Daffy Daily Associates

Universal studios housed Freddie from 1936 to 1943, and then he went over to Walt Disney as chief projectionist, which post he still fills. Mickey, Minnie, Pluto and Donald are on extremely intimate terms with Freddie, but despite the superlative beauty of these color masterpieces he occassionally yearns to handle a lush drawing-room film or a topical subject about, for example, food.

Freddie has been saying "Yes, dear," to the same gal for 23 years, and their two boys, 18 and 20, are now in the armed forces—one with the Army in China, the other a gob at Pearl Harbor. Freddie is a member of the Masonic Lodge, Consistory of Pasadena, and Al Malaikah Temple of Los Angeles.

The Opulent 'Fantasia'

Wonder if Freddie knows that a *revival* of "Fantasia," sans separate sound tracks and intricate interlocks, is now playing on Broadway at $1.50 per ticket? Admitting the timeless quality and universal appeal of Disney's stuff, art comes high at these rates. This Loakes fellow has the reputation of being a fine host to visiting firemen from the effete East and other sectors, but he would appreciate at least five minutes advance notice of any contemplated pa-and-ma-and-kids combinations who seek to enter the Disney fairyland.



Fred J. Loakes

The Trivision 3-Dimensional Process

LENSES of virtually every description have been produced at Bausch & Lomb Optical Company to meet specific requirements. Over the years, specifications have ranged from tiny hemisphere lenses no larger than the head of a pin to the 379-pound prism for the world's largest Schmidt-type telescope at Puebla, Mexico.

One of the latest and most interesting jobs undertaken is production of a large, fast, Balcoted lens for a three-dimensional photographic process invented by Douglas F. Winnek, University of Rochester-trained optics engineer. Winnek's picture-taking method, known as Trivision, was developed after several years' experimental work. Those viewing his pictures find it difficult to believe their eyes, so amazingly true to life is their depth. More amazing still, his photographs are taken with a single lens and do not require the aid of viewing glasses to bring out their startling depth or relief.

Unique Large Diameter Lens

The lens is a 14½-inch *f*:2.2 portrait-type lens. In size, it closely resembles the headlight on a locomotive, measuring eight inches in diameter when mounted. One factor in the success of the startling picture-taking process is the lens' large diameter. Winnek maintains that a camera lens, like human vision can see partly around any object. Thus, the wider the lens, the better the depth perception.

Trivision's inventor points out that this property of a lens is wasted in an ordinary camera because all the light reflections focus on a flat surface. This is actually the remainder of Winnek's secret, for he devised a method of embossing any standard film, black-and-white or color, on the side opposite the emulsion, with microscopically small ridges or lenticulations.

These ridges take the shape of simple plano convex cylindrical lenses numbering about 200 per linear inch. Each tiny ridge acts as a separate miniature lens and divides its portion of the image into two parts. In other words, the film is converted into an optical surface which supplements the action of the large B. & L. lens.

Mobile Camera and Film

To obtain maximum depth or relief, the camera is designed so that it moves across or scans the subject laterally. The film, too, is moved during exposures. It all sounds complicated and it is, but the results are something at which to marvel. When viewing an ordinary portrait, for instance, it looks the same whether one stands directly in front of it or off to one side. Not so with Trivision pictures which provide an astonishing sense of depth. It is actually possible to see around and beyond objects as one changes one's position or angle of view.

For example, objects in the foreground appear to move in relation to objects in the background. Foreground objects also appear to project out in front of the photograph or mount itself. If a pencil point be placed on an object in the picture, such as the center of a flower, the flower appears to project out and beyond the pencil point.

Enormous Possibilities Envisioned

The possibilities opened up by Trivision are obviously enormous. Not only in portraiture, but in aerial reconnaissance, motion pictures, X-ray and clinical work will the effects be of great value. Its inventor says additional work is under way to adapt it to lithographs for use on billboards.

Governmental recognition of the value of Winnek's idea was granted early in the war and much progress toward its perfection came about through special grants of money and facilities. The Navy spent about one million dollars developing the process and also worked out a photo-engraving process to pick up the depth perception of the Trivision camera.

IN THE SPOTLIGHT



By *HARRY SHERMAN*

OF EXCEPTIONAL import to the craft in general is the case brought recently before the Supreme Court for the County of Rensselaer, N. Y., by a former member of Local 285, Troy, N. Y. The plaintiff, John J. McGraw, withdrew from the Local in March, 1917, but not until almost two years later did he enlist in the U. S. Navy.

For 27 years thereafter, or until January, 1946, McGraw served in the Navy. Upon his discharge from the service McGraw, citing a veteran's preference resolution alleged to have been passed by the Local in 1916 and which he contended was still valid, sought reinstatement for full membership in Local 285.

Local 285 denied having ever adopted such a resolution. and even if it had, contended the Local, McGraw, not being considered a member in good standing by reason of his voluntary withdrawal, could not be continued as a "member in good standing." Furthermore, stated the Local, McGraw withdrew from the Local in 1917 and did not enlist in the Navy until February 1919, 23 months later, taking up employment of another nature in the interim. During that period and for the 27 years following he failed to pay any dues.

Supreme Court Justice Roscoe E. Elsworth denied McGraw's application to examine the Local's records, his decision, in part, stating:

"If the resolution under which the plaintiff asserts his alleged rights and upon which his claims for relief is based, was in fact adopted by Local 285 in 1916, it seems rather incredulous that the defendant would have kept the same in continuous force and effect to the present day, thereby making possible the retention by this plaintiff of membership rights therein without financial obligation thereto for a period of some 25 years following World War I and during all of which time it seems undisputed that he adopted and was following the United States Navy as his occupation and career."

● From reports reaching this corner, the first annual dinner-dance held by Hollywood Local 165 (studio projectionists) was a real bang-up affair. Many stage, screen and radio stars were present at the party, a number of them doing their particular specialities for the entertainment of the guests. Among the guests were International Vice-President Carl Cooper, Internationl Representative Roy Brewer, members of several studio crafts and of out-of-town Local Unions. Hilarity prevailed, as could be expected, with the one and only Jimmy (Schnozzola) Durante performing in his inimitable manner.

The entertainment committee—Merle Chamberlin, Pat Offer, and Charles Groman—received warm praise from all present for the excellent job they did in making Local 165's first dinner-dance a grand party.

● Another indication of the humanitarian principles that have long guided the thoughts and actions of the officers of Local 233, Buffalo, N. Y., is the Blood Bank they inaugurated a year ago. The purpose of the Blood Bank is to provide free blood transfusions to members of the Local. Only members of Local 233 are on the Blood Bank roll call and all blood donations are voluntary. Each member fills out a card stating his willingness and physical ability to join the Blood Bank, and a complete record is kept of each donor's type of blood and other vital information. To date three members of Local 233 who were seriously ill during the past year have received free blood transfusions, and owe their recovery to the unselfish acts of their brother members.

● Morris Kravitz, business agent of New York Local 306, who has been on sick leave for the past few months, is sojourning in Florida in an effort to regain his health. He is most anxious to hear from his many friends in the Alliance, and a note addressed to him in care of the Nassau Hotel, Miami Beach, would be most welcome.

● At the Third District meeting held in Boston recently, International President Walsh recommended that no contracts then being negotiated be extended beyond August 31, 1949. Several Locals in that district, however, had already concluded negotiations and had accepted



Photo—Courtesy Leo Moore, L. 165

ATTENDING THE RECENT DINNER-DANCE OF HOLLYWOOD LOCAL 165

Standing: Don Frieling and Jim Eddy, president and business agent, respectively, Local 165. Seated (left to right): Ray Brewer, I. A. Representative; Mrs. Brewer, Carl Cooper, I. A. Vice-Pres.

contracts expiring at a later date. Louis Williamson, business agent of Springfield Local 186, reported that he had negotiated a new contract running to 1950, which calls for yearly pay increases plus two-weeks vacation with pay for each man.

● William Taylor, member of Toronto Local 173 and projectionist at Loew's Yonge Street Theatre for more than 31 years, received a diamond-studded memento pin awarded to all employes of Loew's, Inc. with 30 years or more of continued service. Wm. Covert, International Vice-President and business agent of the Toronto Local, presented the pin to Taylor. Earl Winslow and Charlie Hallett, also members of Local 173, received similar awards.

● Another fighting old-timer has passed on. Roger McKelvey, long a stormy petrel of Pittsburgh Local 171, died last month after a lingering illness. He was a former business agent of the Local and for many years served as editor-in-chief of the Pittsburgh Labor News. He was a delegate to the Central Labor Union, and took an active part in the proceedings of many I. A. Conventions. An ardent unionist, McKelvey always fought to further the welfare of his men. He is survived by his mother, wife, four children, a sister and a brother, the latter, incidentally, also being a member of Local 171.

● After several unsuccessful attempts, the Kansas State Association of the I. A. is now officially organized. A State association was formed in 1930, but due to the lack of cooperation from the various Kansas local unions it was soon disbanded. In 1942, however, the need for such an association was recognized and the groundwork was laid. At the 1946 I. A. Convention in Chicago the Kansas I. A. locals voted unanimously in its favor and the first meeting of the group was held the latter part of August. International Vice-President Felix Snow presided at the first meeting, and Charles Gresty, secretary and business agent of Local 641, Arkansas City, was elected secretary of the Association.



Charles Gresty

● Clarence W. (Pat) Offer, former business agent of Hollywood Local 165, is now the chief projectionist at Monogram Studios.

● We learned recently that the Queen Elizabeth (Cunard-White Star Line), the largest ship afloat, is equipped with two beautifully decorated theatres, including film projection facilities. What we are interested in primarily is whether NATKE (National Association of Theatrical & Kine Employees) has placed any of its men on this boat; or are the ship's officers and crew members running the projection machines? How about it, NATKE?

● Aiming at becoming the outstanding Local Union in the I. A., Chicago Local 110 under the guiding hand of its business manager, Eugene Atkinson, has built up an enviable record of consistent gains for its membership in terms of increased wages, improved working conditions and prestige in the Alliance. From a Local Union that for many years was synonomous with the evils of misguided labor leaders, Local 110 is now looked upon as a model of efficient and reliable management, and has regained the respect of the entire industry. It might be well at this time to summarize briefly a few of the outstanding gains recorded by this Local for 1946:



Eugene Atkinson

1. Members received wage increases, plus paid vacation and pay for preparatory and overtime.
2. Local 110 men placed with various Chicago supply houses to supervise installation of projection equipment at $150 per week.
3. Eliminated the unsanitary conditions that prevailed in many projection rooms. With very few exceptions, practically all exhibitors have complied with the Local's insistence upon proper sanitary facilities for projectionists.
4. Signed contract with the B & K Television Station, WBKB, placing a Local 110 man on the job at $132 per week. Other television stations will follow as soon as they are ready for operation.
5. Exclusive contract with race track for employment of union projectionists.
6. Established road-scale for projectionists working at theatres showing pictures at higher than usual admittance prices.
7. Obtained many extra jobs for the members—1071 16-mm jobs at $12.50 per show, 22 16-mm arc jobs at $40, and 67 35-portable jobs at $40.82 for each show.
8. Made generous contributions to various worthy organizations—$6500 to the American Red Cross, $208 to Boystown, $100 to the Community Fund, etc.

We doubt that one could find a harder working and more zealous union official than Gene Atkinson. The man is a human dynamo, hitting on all cylinders, and just a step or two ahead of the other fellow, as some of the slick exhibitors in Chicago found out to their sorrow. Gene's passion for perfection in all matters was clearly demonstrated at the I. A. Convention in Chicago last summer. The Convention Arrangements Committee, of which he was the chairman, was an example of the precision planning and execution typical of Gene and his able assistants. His election as delegate to the A. F. of L. Convention was an honor shared in by the entire membership of the Local.

Gene attributes the fine record compiled by Local 110 to the whole-hearted support of the entire union membership, and he particularly expressed his appreciation for the grand support rendered him by Clarence Jalas, the genial and efficient secretary-treasurer of Local 110.

● Bruce Kercher, projectionist at the Century Theatre, Parramatta, N. S. W., Australia, would like to correspond with an American or Canadian projectionist.

● The I. A. General Executive Board will hold its mid-winter sessions in Seattle, Wash., commencing Monday, January 27.

● International Representative Al Johnstone acted for the I. A. at the meeting of motion picture executives who gathered in New Orleans last month to lay plans for the Motion Picture Foundation, designed to provide aid to needy workers in the industry. An initial fund of $10,000,000 is sought, and means for raising this sum were discussed at the meeting. Among the methods suggested were special midnight shows, with films, theatres, and labor donated free; certain days set aside for theatre activities, and an all-industry dues-paying membership setup. This seems to us to be a worthy cause, and one sorely needed in the industry.



Al Johnstone

● William D. Lang, known to almost every old-timer in the I. A. as the manager of the Adjustment and Claim Department of the General Office during the regime of Bill Canavan, former I. A. prexy, died recently at the age of 76. In his younger days Lang was active in organizing New York Local 306, and was the business agent of the original Local

(Continued on page 29)

Elements of Projection Optics

V. Another article in a series anent the fundamentals of projection optics

By DR. ANGELO MONTANI
Consulting Engineer, N. Y. City

THE arc lamps generally used for professional motion picture projection are of either the condenser or the reflector type, with the latter, of course, enjoying the widest use because of its particular adaptability for producing an economical high-intensity light.

Figure 1 is a diagram of a reflector arc system. The general information conveyed therein is that the rays of light emitted by an electric (carbon) arc within a wide angle are collected by the concave mirror and concentrated in a much narrower angle to form a focus on the film aperture. We all know, of course, that the most brilliant tip is that of the positive carbon which, shortly after the arc is struck, becomes hollow and assumes the shape of a small crater.

We see from A and B in Fig. 1. that the image of the crater is projected in greatly magnified form on the plane of the film. To insure accuracy of focusing it is necessary to precisely adjust the distance from the reflector to the film plane and also the distance between the arc and the reflector itself.

It is evident from a glance at Fig. 1-B that the condenser system of projection is the more elaborate one, wherein light is reflected from the surfaces of the lenses and is absorbed by the thickness of the glass itself.

A common inconvenience encountered with all high-intensity arcs is the so-called pitting of the reflector or of the inner surface of the condenser lens. Small particles of incompletely burned carbon are precipitated from the carbon crater in all directions. Some of these particles strike and adhere to the polished surfaces of the reflector or condenser lens, constituting thereon a thin layer of white scum. Therefore, daily cleaning of these surfaces with the use of a soft, clean cloth is mandatory. When these particles burn on a glass surface for a time they become permanantly imbedded therein and cause cloudy spots.

We must never lose sight of the fact that the light seen on the screen is the carbon crater image magnified many thousands of times. If the crater changes its position—improper alignment of the carbons, strong air drafts, etc.—screen illumination will suffer to the same degree as that of the crater change.

One of the most valuable aids in maintaining correct arc alignment is the Arc Alignment Bar recommended by the Projection Practice Committee of the S.M.P.E. It is difficult to understand why this tool is not used by every theatre; yet there are many thousands of theatremen who not only do not use it but, in fact, have never even heard of it!

The best optics obtainable, being only one link in the projection chain, cannot insure good screen results if other elements of the system are imperfect or improperly used.

Reflectors and lenses limited by spherical surfaces introduce distortion in the path of the light rays. This topic was discussed in detail by the writer in INTERNATIONAL PROJECTIONIST issues for May and July, 1946.

Figure 2-A shows a reflector limited by spherical surfaces, and in Fig. 2-B a parabolic reflector. We see that the spherical reflector does not concentrate the parallel rays in a point but rather in a *zone of space*. This defect (as we have seen in lenses) is known as *spherical aberration*, which is a consequence of the shape of the mirror. It is possible, of course, to design reflecting surfaces (parabolic) wherein spherical aberration is eliminated and all the rays converge at one point or focus. Automobile headlights, for example, are equipped with parabolic reflectors.

Condenser lenses are designed with parabolic surfaces. The strong spherical aberration present in condenser lenses was exploited in the past as a means for feeding more light through the aperture, because the use of a larger light source was permissible thereby. Today the trend is toward smaller and more brilliant sources. Also, the technique of casting large polished lenses has been greatly improved.

Condenser vs Projection Lenses

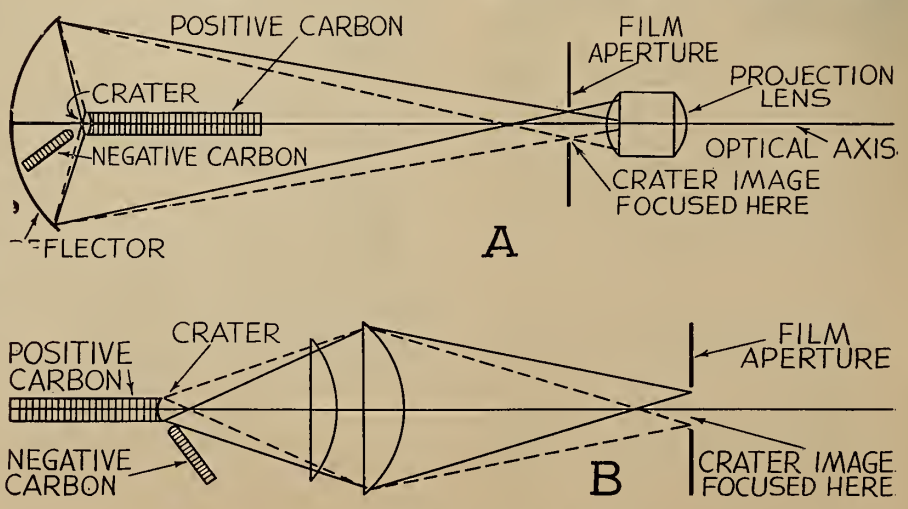
It should be emphasized that the theory and technique of the design and manufacture of condenser lenses is basically different from that employed with the projection lens. Persons uninformed about optical techniques might think that projection and condenser lenses are much the same, except that the latter type is larger. The fact is, however, that condenser lenses and reflectors are exposed to such high temperatures that they require special types of glass and special mechanical mounts.

It is common knowledge that any solid material expands upon exposure to heat. Glass does too, except that glass presents problems which do not arise with metals. Metals are good conductors of heat and therefore the increase in temperature, and consequently the expansion, is uniform.

Glass does not conduct heat, thus the temperature increases and localizes only in the immediate area where heat is applied. Since this results in only a portion of the glass expanding abnormally, the result is a tendency of that particular area to crack. Thus the glass used for reflectors and condensers must have a very low coefficient of expansion, which means that it must expand very little when heated.

The mechanical mounts for reflectors and condensers must be designed with

FIGURE 1



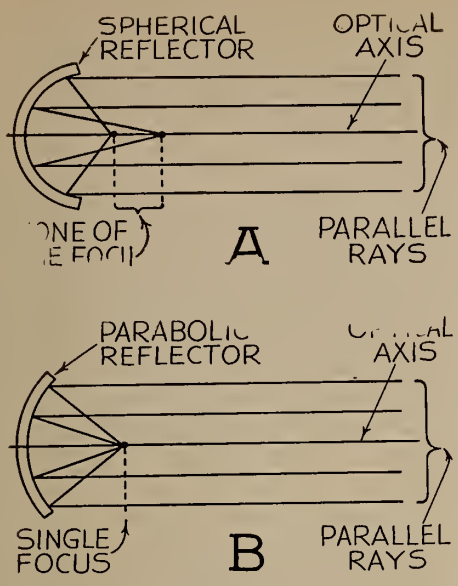


FIGURE 2

springs to hold the glass elements in such way that the springs accommodate the expansion and at the same time hold the elements in correct orientation. So much for the glass.

With respect to the surfaces of reflectors and condensers certain departures from true curvature are permissible. If the same broad tolerance were allowed for the surfaces of projection lenses, the projected image would be highly distorted and blurred. In fact, the surfaces of reflectors and condensers are not polished on the spindle: they are cast.

The method of casting allows the shaping of surfaces different from the spherical. All ground and polished lenses used in projection, for photography and for instruments in general have spherical surfaces. In fact, it is impossible to polish mechanically a surface other than spherical. Lenses and reflectors with non-spherical surfaces for visual or photographic purposes are also made, but these surfaces must be individually polished by hand and the operation requires quite a long time.

By casting into a parabolic polished pattern we obtain a parabolic reflector. Even if the pattern be absolutely perfect when cold, when the molten glass is poured into it the shape of the pattern changes. And even if the shape of the pattern should not change but remain true, the glass casting itself would change during the cooling process.

Fortunately, as previously mentioned, the surfaces of reflectors and condensers do not have to be absolutely true in order to perform well: therefore they are cast in shapes different from the spherical (parabolic, elliptical) for the already mentioned purpose of eliminating aberrations.

At the same time speeds of the order of f:2 and better are obtained. Some readers may wonder why reflector and condenser systems are not corrected for achromatism. The answer is that it is not necessary. Since the reflecting surface is at the front, reflectors cannot split the white light into elementary colors, because the light does not *enter into the glass* but is *reflected* by the mirror coating.

In all other cases (rear-surface reflector and condenser systems) the rays emanating from the light source do not form a "sharp focus" on the aperture: the focii of the different colors all co-exist in the small space around the aperture and, therefore, from their mixture white light is formed again.

Although it is seldom done, optical considerations show that for the most efficient utilization of light the condenser should focus the image of the source of light not on the aperture but on the "second principal plane" of the projection objective—which means at a point slightly inside from the rear element of the objective lens.

25-30 Club Installs Officers, Confers Life Memberships

TALL doings transpired in Manhattan projection circles the evening of January 9 when the famed 25-30 Club of New York installed its officers for 1947 and thus provided the setting for the granting of honorary life gold membership cards to deserving workers in the amusement vineyard. Scene of the festivities was the Headquarters Restaurant, directed by the former head service man and chief chef of General Eisenhower's G.H.Q. in Europe.

Retiring officers of the Club, both of whom have served for the past seven years, were Mike Berkowitz and Henry Weinberger, each of whom was presented a gold life membership card. The 1947 official slate is comprised of Morris Rotker, president; Cecil R. Wood, Sr., vice-president; Joseph Fitterman, financial secretary; Morris Klapholz, recording secretary; Albert A. Kaye, sgt.-at-arms. Trustees are Joe Abrams, Dave Narcey, and William Salke.

Honorary gold membership cards were presented to Gene Atkinson, business manager of Chicago I. A. Local 110 and I. A. delegate to the A. F. of L.; Walter E. Green, president of National Theatre Supply Co. and vice-president of General Precision Machine Corp.; M. D. O'Brien, assistant director of projection and sound for Loew's theatres; Major Leslie E. Thompson of R.K.O. Theatres Corp., and Charles Vencill, secretary of Los Angeles I. A. Local 150 and president of the National Conference of Union Labor Legionnaires, Inc.

Messrs. Atkinson and Vencill were awarded their cards in absentia, although both marked their election by lengthy telegrams received at the party. Toastmaster Harry Sherman, of I. P., made personal acknowledgment on behalf of each.

Particularly appropriate was the choice of tenders of the honorary cards to the three recipients present. Walter Green received his card from an old friend and business associate for many years, Cecil Wood, Sr., veteran projectionist who by virtue of his extensive



Walter E. Green



M. D. O'Brien

road tours is known to thousands of brother craftsmen throughout the country.

M. D. O'Brien was tendered his card by his long-time co-worker, Lester B. Isaac, director of sound and projection for Loew's theatres. Major Thompson, who handles labor contract matters for R.K.O., was handed his card by Solly Pernick, business agent for New York I. A. Local 1, who for many years has negotiated stagehand matters with the Major.

It goes without saying that there was plenty of food and other temptations to the palate and a fine program of entertainment amid a pervasive atmosphere of hilarity and fellowship—all of which added up to one of the most successful gatherings in the history of the Club. Officers and members of the 25-30 Club extend a most cordial invitation to all I. A. men, when they are in the New York area, to attend their meetings.

Projection Worthies Present

Among those present, in addition to those already mentioned, were the following:

Charley Mueller, chief of Radio City Music Hall; Nat Ripp, RCA; Ralph Kautzky, president of Associated Electronic Engineers, organization of I. A. sound servicemen; Herman Gelber, president of Local 306; Joe Engle, projectionist Local 640; Cy Braunstein, film editors Local 771; Joe Clayton, Local 306, maker of Clayton takeup devices; Herman Landwehr, managing director, Capitol Theatre, N. Y. City.

Also Jimmy Frank, Allen Smith, and W. Nayfash, National Theatre Supply Co; Harry Rubin, director of projection, Paramount Theatre; from International Projector Corp., Arthur Meyer, P. A. McGuire, R. W. Servies, and Rudy Kneuer; from Hudson County, N. J., I. A. Local 384 a delegation comprised of Tony Boscarelli, Al Kaye, Tom Neathery, Walter Bemis, Toby Abramowitz, and Henry Stuber.

Also Abe Lang, Bob Goldblatt, Eddie Stewart, Harry Mackler, Charlie Eichhorn, Cecil Wood, Jr., Otto Kafka, Bob Levy, John Koler, Barney Weiner, Freddie Stofregen, Sr. and Jr., Paul Seigman, Abe Seligman, Joe Abrams, and Jim Finn.

LETTERS TO THE EDITOR

Anent the Forest Electronic Lamp

To the Editor of I. P.

I read with considerable interest the articles relative to the Forest Electronic Arc Control which have appeared in I. P.[1] I wonder if Dr. Lee de Forest, who I believe founded this company, would have approved of this multiplicity of gadgets to handle a Suprex arc. The old high-intensity thermal control did practically all that the Forest Control does and it certainly wasn't any more complicated.

Perhaps I am wrong in my assumption, but why employ such elaborate means of regulation? Granted that the arc lamps now in use are outmoded in the sense that they function not unlike a hand-feed job more or less of the time, it seems to me that the Forest Control still requires simplification to obtain proper results.

I can think of one means of accomplishing this, although I do not know whether it has yet been tried out. Suppose we used two photocell and exciter lamp assemblies so arranged that a beam of light crossed the paths of the positive and negative carbon peaks. This setup could be so adjusted that when the carbons were not in exact position the motor controlling the unit would operate, thereby putting the carbons in correct alignment. Until the carbons burned down sufficiently of course, there would be no motor action.

Suggests Other Control Means

There would be separate motors for both the positive and negative carbon carriages, with a direct drive for the feed screws to instantly advance the carbons the required amount. Of course, there are several obvious disadvantages to such a system, one such being the actinic rays from the arc itself which might interfere with precise photocell operation. However, ultra-violet light or some other wavelength could be employed with wholly satisfactory results. There are many radio principles that could be used to do the same job.

I may sound a bit like the conventional carping critic, and I certainly do not wish to detract from the merit of the job accomplished by Jim Elderkin in this instance. However, since I do feel that the system could be much more simplified, I see no reason why I or anybody else who thinks so shouldn't stand right up in meeting and say so.

JOSEPH E. BLIVEN
I.A.-Local Union 439, New London, Conn.

[1] "The Forest Electronic Arc Lamp," by J. K. Elderkin; Sept. and Octoher, 1946, issues of I. P.

The Forest Viewpoint

To the Editor of I. P.

We are always glad to have the comments and reactions of projectionists, since they are the boys who have to live with the equipment and they are certainly "in the know" when it comes to seeing the faults as well as the attractive features of projection equipment.

I am afraid that I will have to differ with Mr. Bliven on several of the points he makes. Dr. Lee de Forest was not the founder of Forest Manufacturing Corp. nor has he at anytime had any connection with us. However, knowing Dr. de Forest as well as I do, I believe that his reaction to the Forest Electronic Arc Control would be exactly opposite to that expressed by Mr. Bliven.

I believe that the eminent Doctor would look upon the Forest Control with great favor. Certainly he has always been electronically-minded and certainly he always sought the simple and positive solution to any problem at hand. Extreme simplicity is one of the chief advantages of the Forest Control.

I cannot agree that the old high-intensity thermal control would do practically anything the Forest Control does. Obviously, the only true test of a given unit of equipment is its behavior in operation, and it is easily understandable that having had no opportunity to operate or even inspect the Forest Control, Mr. Bliven would not be fully familiar with its extreme simplicity and very positive action.

Great Simplification Noted

Mr. Bliven acknowledges the deficiencies of existing arc control means, particularly when he states that present lamps must be hand-fed "more or less of the time." Mr. Bliven's appreciation of the Forest Control would be heightened, I am sure, if he knew that it accomplishes the elimination of approximately 250 parts now used in existing lamps. The Forest feed mechanism is reduced to a simple carbon carriage with its worm screw driven directly from a solenoid without the aid of any reduction gears or clutches.

The Forest Control is a *constant* feed as contrasted with other lamps the feeding means of which impart a jerky movement to the carbons. Other lamps have a mechanical pickup which feeds the carbons up at too fast a rate and then waits until the carbon burns away, inevitably too far, before it again feeds up. This means that the arc gap is never at the proper distance but is either too short or too long.

Cites Meter Steadiness

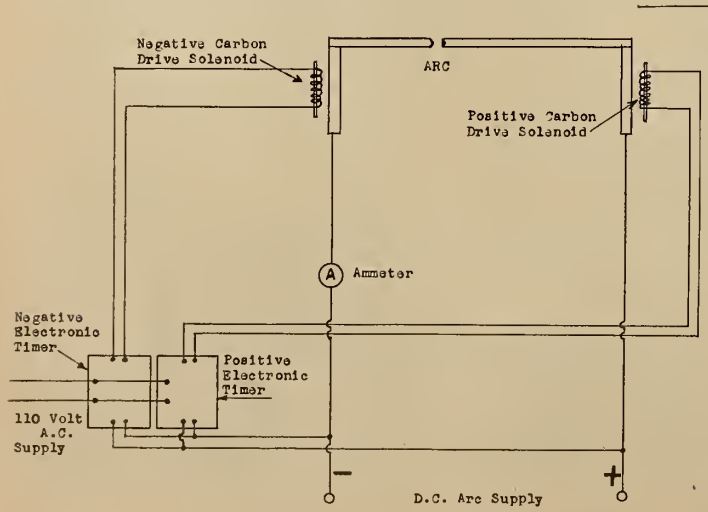
For example, with existing lamps an ammeter in the arc circuit will vary constantly plus or minus from 3 to 5 amperes. On the Forest Control the ammeter needle stands practically still at a constant reading. The implications of this fact in terms of more even burning and consequent even light intensity are so obvious to all projectionists as to require no extended comment herein.

The Forest Control feeds the carbons at their precise rate of consumption so that they cannot burn away from the exact focal point. The necessity for hand-feeding, as mentioned by Mr. Bliven, is thus eliminated.

Existing arc lamps depend upon the arc gap being *incorrect* before the mechanism operates to correct the condition. As the arc gap widens the motor speeds up in an attempt to reduce the gap. When the arc gap is too short the carbon simply has to burn away to a point where the gap is again too wide.

The Forest Control is new and novel

(*Continued on following page*)



Schematic wiring diagram for Forest electronic projection arc lamp.

Bi-Pack Photography Now A Formidable Color Entry

The steady onward march of bi-pack color photography into the favor of Hollywood technicians was capped by the recent release of the full-length Cinecolor feature film "Gallant Bess". Through the courtesy of our West Coast contemporary, "International Photographer," I.P. readers are afforded a recapitulation of how the bi-pack process developed.

By WILLIAM T. CRESPINEL

THE method of photography known as "bi-pack" is now in universal use with excellent results, and for the interest and education of the many technicians now interested in this system, the following treatise has been prepared:

The records indicate that M. F. de Colombier of France received a French patent on a tri-pack system as early as 1908, but the authority states. "—like so many French patents it is a little indefinite in phraseology."

G. Battistini received a British patent in 1915 for either bi-pack or tri-pack. By the tri-pack system two cameras were mounted at right angles to each other. One camera carried two films with their emulsion surfaces in contact; the second camera carried but a single negative. Between the lenses of the cameras was a transparent mirror which transmitted and reflected the photographed image to the respective films. In the true sense of the word, this cannot be termed tri-pack since tri-pack means three films together, *i.e.*, as a pack.

By Battistini's two-color systems two films were placed in the camera, their emulsion surfaces in contact, the front film being stained orange to act as a filter to the rear film. The method of projecting the positives from either of the above systems of photography is somewhat nebulous. It is claimed that "positives from each negative were to be stained with the complimentary color of the filter, and the positives might be placed one behind the other in an ordinary projector."

Obviously, if this were attempted there could be no register of the images on the screen. It must be assumed, therefore, that like so many other early color experiments, the ideas were quickly abandoned.

F. E. Ives patented a bi-pack system in 1919. Like other experimenters, he required that the front film be quite translucent in order to obtain a sharp rear negative. In order to obtain contact of the two films, Ives used a glass plate in the camera aperture and a resilient squeezing pressure at the rear. The glass plate, however, proved to be unusable due to emulsion dust which gathered thereon and, quite naturally, showed as white spots on the negatives.

It should be noted that there is no record of any of the aforementioned systems having passed beyond the experimental stage.

About 1924, the writer, in conjunction with the late W. D. Kelley, of Prizma fame, conducted experiments with the thought in mind of exploring the further possibilities of bi-pack. A few rolls of translucent film were obtained and, in conjunction with a panchromatic negative, photographed in a Bell & Howell camera. The results were far from encouraging. The rear negative was fuzzy to the point of being unusable, and the exposure between the two negatives very unbalanced as to density due to the emulsion differences of the two negatives.

Later, in 1928, the writer was confronted with the problem of determining a method of color photography for a new company in which he was interested—namely, Multicolor. A stereoscopic camera was available, the camera having a pair of matched lenses mounted 2¾ inches apart. A set of prisms had been constructed to mount in front of the lenses to allow like images to be photographed onto a pair of panchromatic films through complimentary color filters.

To the writer, the idea of using a camera of this nature was far from interesting. It was not a practical approach to a color camera, and the idea of a series of prisms and twin lenses presented many optical problems.

The idea of bi-pack was once again discussed. It was decided to ignore previous attempts as far as a thin emulsion of the front film was concerned, and to experiment with a front film with standard emulsion. A small roll of standard orthochromatic negative was wound emulsion to emulsion with a similar length roll of panchromatic negative. No attempt was made to obtain color values.

The negatives were placed in a magazine and threaded through one gate of

(*Continued on page* 27)

FOREST ELECTRONIC LAMP

(*Continued from preceding page*)

and has never been used before in any type of lamp. Mr. Bliven suggests that the same result could be obtained by the use of photocells, exciter lamps, etc. Such a setup would necessarily be complicated and quite costly and here again would depend for its operation on an incorrect arc gap before corrective action were taken. This setup would simply be a means for the *correction of error* instead of *preventing error* as does the Forest Control.

The Forest Electronic Control uses no photocells, exciter lamps, amplifier or apertures. It feeds independently of the arc supply at the exact rate of carbon consumption and maintains the arc at the proper focal point. What could be simpler than this? I believe that when Mr. Bliven has the opportunity to use the Forest Control he will agree that it makes good all the claims made for it.

J. K. ELDERKIN
Forest Manufacturing Corp.



NEW AND ENLARGED HEADQUARTERS OF LaVEZZI MACHINE WORKS

Shown here is the new home of the LaVezzi Machine Works, manufacturers of projector replacement parts. The opening of the new factory, now located at 4635 West Lake Street, Chicago, was celebrated with a party which was attended by representative dealers and manufacturers in the industry.

Trade Unions in America

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

This is the second of a series of articles constituting excerpts from the book "Craft Unions of Ancient and Modern Times," which was privately published and copyrighted by this militant American labor leader. Subsequently installments will chart the progress of organized labor from the earliest known to modern times.

OF THE Phoenician crafts our principal source of information is from the "History of the Jews" of Flavius Josephus, who lived when Titus conquered and despoiled Jerusalem, and from the account of the building of Solomon's Temple in Jerusalem which is found in First Kings and Second Chronicles in the Old Testament. We will return to these Phoenician craftsmen later on, after examining some of the records left by Roman craftsmen.

The earliest historical reference is given by that greatest biographer of the Roman period, Plutarch, A. D. 45-120. In his life of Numa Pompilius, Plutarch writes, in part:

"But of all his measures the most commended was his distribution of the people by their trades into companies, or guilds; for as the city consisted of, or rather did not consist of, but was divided into, two different tribes, the diversity between which could not be effaced and in the meantime prevented all unity, and caused perpetual tumult and ill blood, reflecting how hard substances that do not readily mix when in the lump may, by being beaten into powder, in that minute form be combined, he resolved to divide the old population into a number of small divisions, and thus hoped, by introducing other distinctions, to obliterate the original and greater distinction, which would be lost among the smaller.

"So distinguishing the whole people by the several arts and trades, he formed the companies of musicians, goldsmiths, carpenters, dyers, shoemakers, skinners, brazers (metal workers) and potters, and all other handicraftsmen he composed and reduced into a single company, appointing every one their proper courts, councils and religious observances. In this manner all factions, distinctions began for the first time to pass out of use, no person any longer being either thought of or spoken of under the nation as a Sabine or a Roman, Romulan or a Tatian; and the new division became a source of general harmony and intermixture."

If Plutarch had been a craftsman, his account would have been more illuminating, for his understanding of what was done by Numa Pompilius would have been more explicit.

The Roman Kingdom came into existence some 700 years B. C. At that time, small as Rome was, the craftsmen had already organized their craft unions.

Unions Increase and Flourish

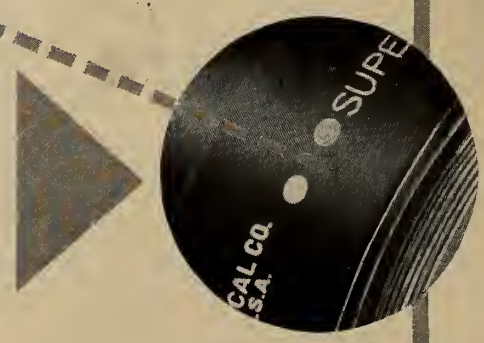
Apparently these unions were composed of separate organizations of the same craft, the division being the tribal or national origin, whether Roman, Sabine, Romulan or Tatian. It was much the same as though our national and international unions of today were based upon national origins as well as upon craft. Then we would have a number of international unions of the same craft but conflicting national origin, creating a confusion and turmoil which would make our occasional jurisdictional squabbles pale into insignificance. The crafts, divided against each other by national origins, would have been helpless to protect themselves from exploitation. What is of outstanding importance is the fact indicated by Plutarch's account, that before the beginning of the Roman King-



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YELLOW DOT means that Super Cinephor lens elements have been cemented by a special heat-resisting, permanently clear, synthetic thermosetting cement, perfected by B&L. This cement withstands the high heat of the arc without fracturing, blistering, or crystallizing.

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dom, Roman craftsmen were organized.

From other sources we know that as Rome grew so did the number and strength of the craft unions. They developed their organizations during the period of the Kingdom, they flourished throughout the existence of the Republic, and as Imperial Rome extended her conquests and established her colonies, the crafts followed and organized throughout the then civilized world.

It has been possible to secure a glimpse of this extension of the crafts beyond Italy, as well as within Rome proper, through the careful cataloguing and study of inscribed stones which survived the ravages of time and the Vandals.

Some two generations ago a few sincere students gave their time and patience to the cataloguing, deciphering and translation of inscriptions carved on altars, votive tablets, columns and many other records inscribed on stone, including public proclamations. It is largely from these that we find a craft union record which indicates how extensively they had developed, and to learn of some of their activities as well as form of organization.

There is always the possibility that the record of an ancient workmen's organization may have had no craft or trade union significance, for the people of antiquity had religious and fraternal organizations. As many craft unions fell under the displeasure of Roman Emperors they may have hidden their true character under the guise of funeral or other religious societies in the same manner, and for the same reason, which led the early English trade unions to mask their character under the guise of "friendly societies."

This much the records make clear, that as the craft unions grew in strength, experience and wisdom, they added to the purely craft features the substance of fraternal and religious activity. Committees were appointed to visit the sick and bury the dead. Many of the crafts erected altars in the temples so that the craftsman making his sacrifice or oblation did so on the altar of his craft.

Associations Very Ancient

Andrew Stephenson, in his "History of Roman Law," writes: "Guilds are said by Plutarch to have been established by Numa Pompilius, who organized the artisans and craftsmen who had made their way into the city into eight or nine of these associations. Whether it was actually Numa who first organized these trade unions, it is certain that such associations are very ancient.

"It was the creation of such associations among the plebians that compensated, to a certain extent at least, for the absence among them of gentile, cultured organization. By means of these guilds the plebians obtained a common cult, and possibly a common burying place, with a master and his council to manage their affairs, consolidate customs, arrange and adjust disputes. These guilds cannot be said to have had any political significance in the first stages of their life. Their members were bound together, not indeed by descent, either real or fictitious, from a common ancestor, but by interdependence and by similarity of tastes and occupation."

An interesting relic of a craft union far from its original home is a Roman votive altar now housed in the Museum de Cluny in Paris. It had originally been placed in the Temple of Jupiter, which was erected on the site now occupied by the Notre Dame de Paris. It had been placed in the Temple by the Boatmen's Union of the Seine, a branch of the Boatmen's Union of the Tiber. The legible part of the inscription, as translated by Osburn G. Ward, reads:

"The Boatmen's Union of Paris publicly established and dedicates this monument of their temple to the Aug. Tiberious Caesar the Great and the Best under Jupiter, Protecting God of Rome." Incidentally, this was the first record of the ancient Roman craft unions which the writer saw. Fortunately, it was not the last.

As shown from the records extant, the Roman unions were concerned with four main activities: the regulation and strict supervision of apprentices, collective barbaining and, as will be shown later on, they thoroughly understood the drafting

(*Continued on page* 30)



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JOE ROBIN

JOE ROBIN is dead . . . and those few words signify the passing of one of the swellest guys who ever graced this or any other business. Returning to his home in Palisades, N. J., a few days before Christmas, following a protracted stay in a New York hospital, Joe suffered a severe heart attack which ultimately proved fatal.

Projectionist, designer, manufacturers' representative, supply dealer in both the domestic and foreign fields, and organization head, Joe Robin's standing as an all-around motion picture technician probably has never been equalled, certainly never surpassed.

A brief recapitulation of Joe's affiliations testify to the breadth of experience he possessed: Nicholas Power Co., Precision Machine Co., Roth Electric, Brenkert Light Projection Co., Kollmorgen Optical Co., Morelite Co., Strong Electric Corp., Century Electric, International Projector Corp.—Joe traveled every highway and byway of motion picture technology. Since 1932 he has been a vice-president of Imperial Electric Co., for whom he designed the generator of the same name.

Founded Dealers Association

Joe was the founder and first president of the Independent Theatre Supply Dealers Association, and it was through his personal efforts that this organization survived the number of years it did. Such an organization was considered an impossibility, but Joe did the job and made it stick. Subsequently he formed Joe Robin, Inc., an export house for motion picture equipment. Joe was a member of Motion Picture Pioneers, the S.M.P.E., and during the war he served with the War Production Board.

Joe Robin, Inc., of New York will continue operations under the direction of Mrs. Luella Robin, who will be assisted by her sons, Thomas and Charles.

Words are quite futile to convey an adequate understanding of the stature of Joe Robin as a man, but what needs to be said here, *must* be said, is that he was one of the best ever, one whose passing will leave many an ache in the hearts of his thousands of friends.

World's Largest Prism From Bausch & Lomb Glass

The largest piece of optical glass ever obtained has been successfully finished into an astronomical objective prism. The huge piece of Bausch & Lomb glass from which this prism was made was about 100 pounds heavier than the one which was prepared for the prism being used at the Warner and Swasey Observatory at the Case School of Applied Science.

It took two months before the single piece of glass from which it was made was formed in one of the melts, each melt containing approximately a ton of flint glass. The glass had to be perfect, in a process where perfection is rarely attained in pieces of glass larger than 50 to 60 pounds in weight.

Annealed Twice; 2-Month Job

The unfinished glass was placed in a clay mold, heated to a temperature approximating 1000° F. and then annealed. This annealing was not sufficient, and a re-annealing was necessary. Re-annealing required about two months' time, but as a result, preliminary rough polishing of the blank at Bausch & Lomb showed the glass to be flawless, and examination with polarized light showed it to be strain-free.

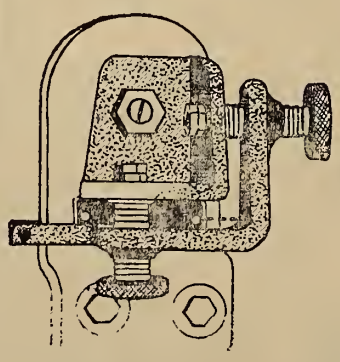
There have been larger optical elements made, but only for reflecting telescopes. Glass for scientific instrument prisms through which light passes must be of superb optical quality, far superior to that used in reflecting telescopes.

The finished prism is slightly more than 27 inches in diameter, with a 4° angle, and will be mounted directly in front of the corrector plate of the 26-inch Schmidt-type telescope at the Observatorio Astrofisico Nacional, Tonansintla, Puebla, Mexico.

RCA EXPANDS N. Y. STUDIO

East Coast sound recording facilities industries have been advanced by the enlarged and completely renovated RCA scoring and recording studios at 411 Fifth Avenue, New York City, for both 35- and 16-mm film.

An important new activity to be accommodated is the dubbing of foreign language narrative and lip-synchronized dialogue on film originally recorded in English, for distribution abroad. At the same time, the new studio will accommodate a substantial increased schedule of English language narrative recording, sound effects recording, music scoring, and re-recording.



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BI-PACK PHOTOGRAPHY

(*Continued from page* 23)

the aforementioned stereoscopic camera. The prisms were removed, since they played no part in the experiment which was purely for the purpose of determining possible sharpness or lack of same of the rear negative, as well as possible difference of density of the two negatives.

Remembering the sad results of past tests, it was with some qualms that the exposed negatives were examined after developing. To the amazement of all, both negatives were perfectly sharp and well balanced as to density: the reason being that by the particular design of the camera gate, both films were held rigid during the exposure period by a back plate three inches long, the surface of which was covered by chamois leather. Further, the front plate was perfectly flat, highly polished, and without recess. Thus, conditions were perfect for the bi-pack test.

It was then decided to repeat the test, using a Bell & Howell camera. Again two negatives were exposed, developed, and examined: the result being a total failure as far as the rear negative was concerned, it being without sharpness at any point. Had not the previous test proved that a sharp negative could result under certain conditions, the tests might have again been abandoned.

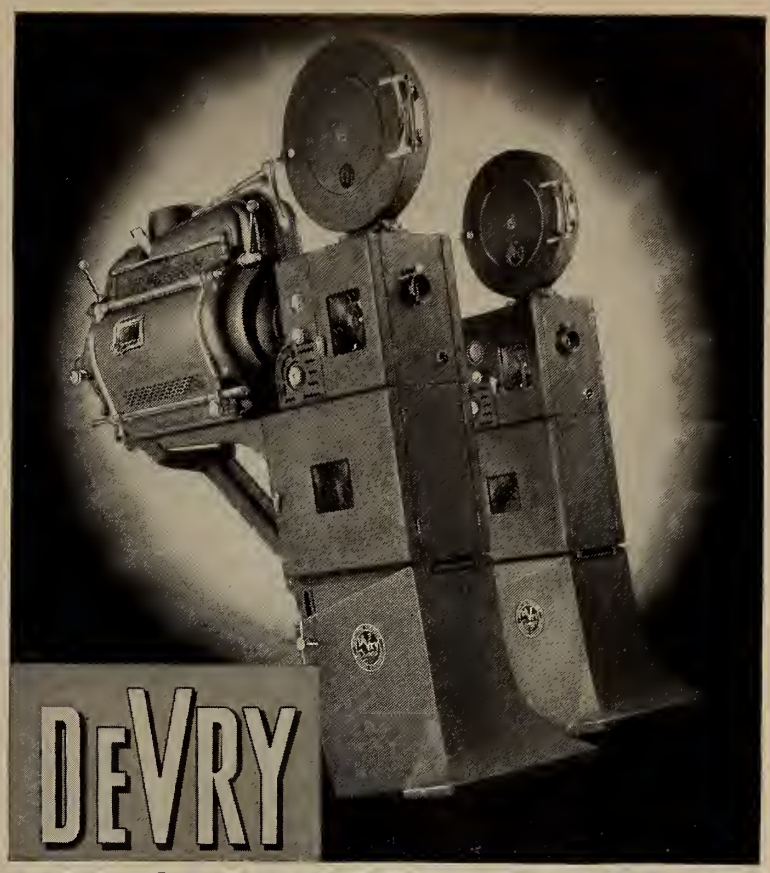
But we had proved our theory once with excellent results and were able to realize that the failure of the second test was due to lack of adequate contact in the camera gate. Having proved that a sharp rear negative was possible, the rear plate of the Bell & Howell shuttle was built up with solder to the point where contact of the two negatives was assured.

Color Value Requisites

The next step was to consider color values, which required a filter of some nature to prevent those colors which were recorded onto the front negative from reaching the rear negative.

The logical procedure was to dye the front negative (which would be orthochromatic) with a red or red orange dye which would absorb certain colors and transmit those complimentary to that film. Several dyes were tried over a period of weeks without success, due to the fact that many dyes will react to unexposed emulsions and will create a chemical reaction which, when developed, shows as a heavy fog.

While the dye tests were being made other filter methods were explored. One in particular proved to be an interesting experiment. We took a Wratten 23-A filter and cut a length the width of a picture area—3 inches in length—and mounted the filter on two metal arms positioned so that the two negatives were threaded through the camera gate with the filter sandwiched between the negatives. The results were good as to color separation, but the method was a failure due to the rubbing of the emulsions against the stationary filter, thus creating rub marks on the filter



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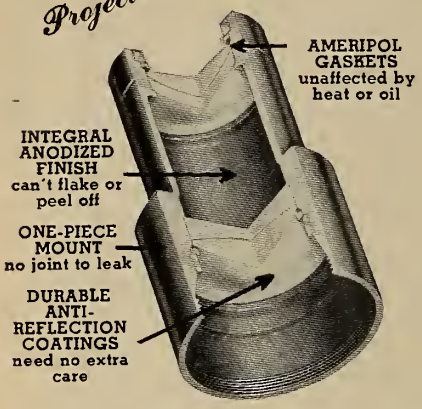
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which were recorded on the rear negative.

Subsequently, a dye was found which reacted favorably to the negative emulsion—that is, there was no fogging effect. This would be around 1927.

Many hundreds of feet of ortho negatives were dyed in our laboratory in order to conclude the tests to prove the practicability of this method of photography as to color value, resolution of the negative images and register of the pair of negatives to positive film. Needless to say, each point was proved to our complete satisfaction. This then became the first commercial use of bi-pack as a means of color photography.

All experiments and tests were conducted by the writer.

Commercial Bi-Pack Film

Having determined that bi-pack would become our means of obtaining color value negatives, it was decided that it was inadvisable to continue to dye the front negative in our lab because conditions were not satisfactory for this important operation. With this thought in mind we approached E. I. DuPont de Nemours & Co. We explained our desires and showed both negative and positive tests, which interested the company to the point where they decided to manufacture and sell a bi-pack negative of a nature similar to our tests.

The first important use of DuPont's bi-pack—which we termed Rainbow negative—was by Jerry Fairbanks, President of Scientific Films. His "Strange As It Seems" films were all photographed using bi-pack. Mr. Fairbanks has continued to use this system, through the many years on his various shorts.

Eastman subsequently placed a product on the market of a similar nature to DuPont's. Today bi-pack is in universal use, both for shorts and features.

The first ambitious attempt to produce a major feature by this system was M-G-M's "Gallant Bess," produced in Cinecolor by Harry Rapf and photographed by John Boyle, now in general release. Hal Roach studios have contracted to produce a number of features in Cinecolor by the bi-pack system. Five of these have been finished as far as production is concerned.

The present high quality of bi-pack photography, plus the Cinecolor method of producing release prints, is creating more than a passing fancy in the industry and high budget pictures are currently before the cameras.

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IN THE SPOTLIGHT

(*Continued from page* 19)

35 when it was known as the Calcium Light Operators—a decade before it was merged with the present Local 1. He attended his first convention in Cincinnati in 1899, when our organization was known as the NATSE instead of the IATSE.

Lang last worked as a projectionist, holding a membership card in Westchester, N. Y., Local 650. He had been in failing health the past few years, and through the kindness and consideration of Arthur Martens and Dick Hayes, president and business agent, respectively, of the Westchester Local, Lang received the care and attention he so richly merited.

Funeral services were attended by International President Walsh, General Sec-Treas. Raoul, and representatives from many I. A. local unions.

● Last month we mentioned herein that a New York Local 306 member was placed on the steamship America to show motion pictures. Since then we learned that Herman Gelber and Steve D'Inzillo, president and acting business agent, respectively, of the Local. have successfully concluded negotiations with the steamship line whereby each ship leaving the New York harbor will carry TWO union projectionists. The salary for each man is $275 per month, plus room and board, with the projectionists sharing the same cabin.



Herman Gelber

Other steamship lines showing motion pictures on their boats are falling in line and have signified their intention to go along with Local 306 on the two-men projection shift just as soon as their ships are returned to civilian operation.

We should like to hear from other seaport locals as to what progress is being made in placing I. A. projectionists on ships leaving their ports.

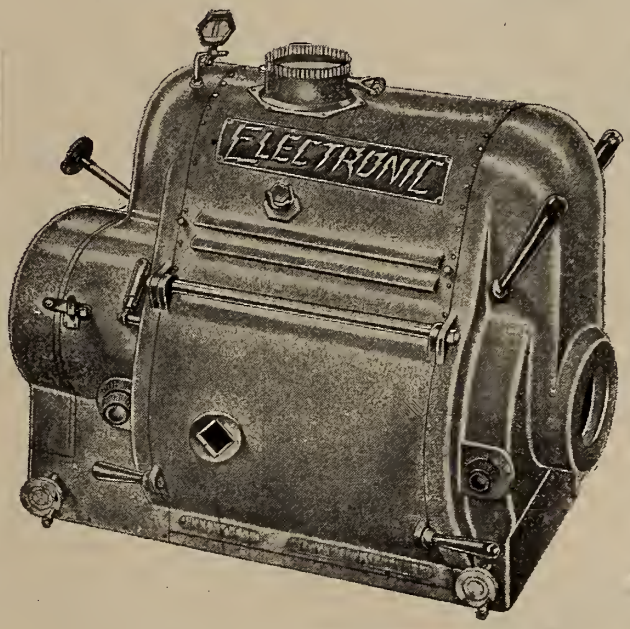
● After 30 years in office, Tom Reed, former business agent of Local 224, Washington, D. C., has decided to call it a day and take things easy. We saw Tom during a recent visit to Washington, and he mentioned his desire to devote more time to his family and enjoy a bit more leisure.

● The newly-elected officials of Hollywood Local 165 are to be congratulated on their new contracts. For the first time in the Local's history the members are guaranteed a weekly wage and are *not* subject to call at any hour of the day or night. The new contract calls for a 40-hour week at $116.40 per week, pay for holidays and two weeks vacation with pay. Those members of the Local classified as sound engineers will receive an additional $10 per week. Nice work, boys.

● We are happy to report that our good friend, Abe Seligman, member of Local 306 and the 25-30 Club, was discharged from the Will Rogers Memorial Hospital at Saranac Lake. He plans to return to work sometime in March.

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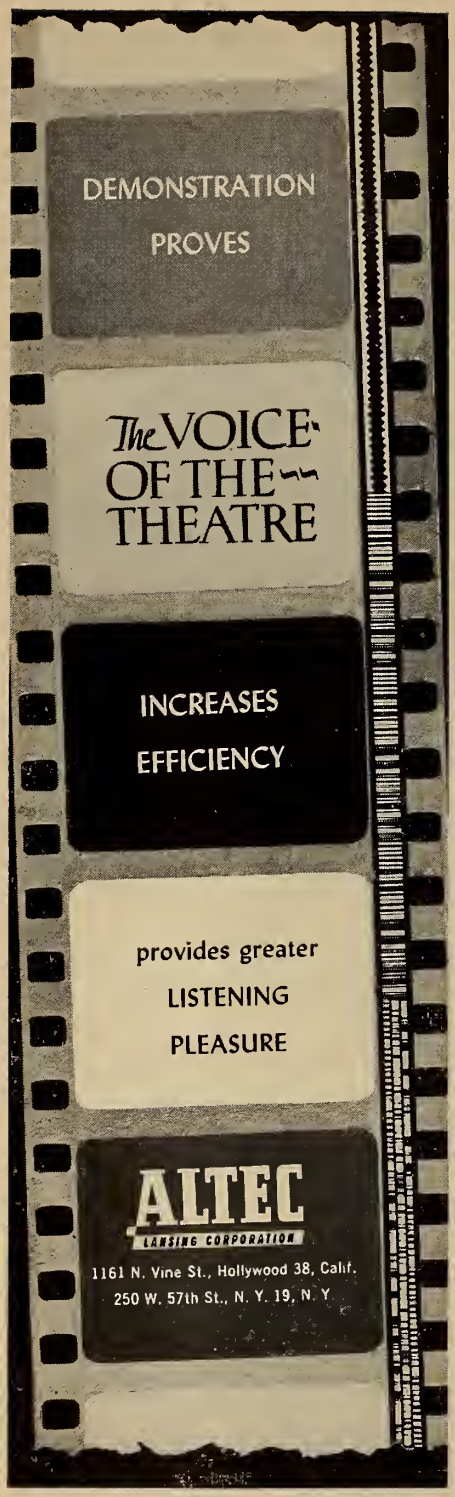


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TRADE UNIONS IN AMERICA

(*Continued from page* 25)

of agreements with employers or governmental officials, their policy of *refusing to work with non-members*, and their use of the strike, the collective stoppage of work, as a means of adjusting their grievances when all other methods had failed. As already referred to, they even struck against the decrees of the Roman Senate when these were considered too arbitrary or unjust.

In the early days of the Roman unions the good fellowship features were well developed. There was feasting in common on numerous occasions. Funeral benefits were an integral part of most constitutions. There is no evidence of sick benefits, but each union had a committee whose duty was to visit all sick members. There seems to have been no thought of paying strike benefits.

Some unions, after the end of the Republic, assisted slaves who were craftsmen to purchase their freedom from their owners, the union advancing the price and the freed man repaying the debt in installments.

The religious side was a predominant as in the medieval guilds. Each craft union had its cult with its patron deity [there were no saints in those days]. Its deity was usually the heathen god whose attributes were nearest to the craft in question. The union also had its special religious festivals, processions and sacrifices.

Some of the unions with large membership had their own priests. The inscribed records of the Elder Carpenters of Ptolemias and the Rye Millers of Alexandria each record the employment of their own priest. Without doubt these unions had erected their own altar in the temple, and their priests functioned at these altars.

Crafts Active Politically

It was in the meetings of these unions when constitutions and by-laws were being prepared or amended, when the welfare of the craft was being discussed or when the officers were being elected, that the membership learned the practical lessons of self-government which prepared them to later play a prominent part in government during the Republic.

Gains informs us that the law of the Twelve Tables, the basic law of the Kingdom, "allowed members of an association to make any by-laws they pleased provided they do not infringe any public law."

There is ample evidence that the crafts in time became politically active, but there are few specific instances recorded. A municipal election was to be held in Pompeii about a month after Vesuvius overwhelmed that city with volcanic sand, ashes and lava. As the ruins were excavated in the modern times, a number of political posters were found on the city's walls and buildings, some put on with brush and paint, some with chalk or charcoal. Two of these definitely indicate their character. One reads:

"The members of the Fishermen's Union make choice of (nominate) Popodius Rufus for member of the public works." The other was phrased in a more mandatory tone: "The International Goldworkers Association of the City of Pompeii demand for member of the board of public works Cuspis Pansa."

The unions' political activities without doubt played a part in their relations with the Senate. During most of the republican period much of the public work was done by the crafts under direct contract with the Senate. There were no intervening contractors between the Senate and the unions. The public treasurer made payments from time to time to the officers of the union, who in turn distributed the money to the membership.

As the patricians grew in power, and conquest brought slaves and prisoners to Rome, members of the nobility hired or bought them from the state. They were able to secure contracts for public works from the Senate. Then began what ended in a destructive competition for many of the craft unions.

[To be Continued]

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The World's Largest Manufacturer of Projection Arc Lamps

PERSONNEL

Dan D. Halpin, pioneer in the promotion of commercial television, has been appointed RCA Television Receiver Sales Manager. Joining RCA in 1940, Halpin has been television sales manager for New York, coordinator of the first large-screen theatre television, and coordinator of RCA department store tele. During the past 15 months he has addressed more than 100 organizations and trade groups on the subject of tele.

Halpin is a past president and director of the American Television Society, a member of the Sales Executives Club of N. Y. and of the Western Universities Club, and past president of the Notre Dame Club of N. Y. Graduated from Notre Dame in 1931, he managed the late Knute Rockne's last national championship football team of 1930.

* * *

Frederick R. Lack, vice-president and a director of Western Electric Co. in charge of its radio division, was elected president of the American Standards Association at the recent 28th annual meeting of this organization in N. Y. City. Mr. Lack began his career with Bell Telephone System which he joined in 1911 as an assembler.

During the late war he was for a time director of the Army and Navy Electronics Production Agency. In the first World War he served in France with the Signal Corps. He is a director of the I.R.E., the R.M.A. and the Smith Winchester Mfg. Co., and a member of the A.I.E.E. and the American Physical Society. He is president of the Harvard Engineering Society.

* * *

A. R. Hopkins has been named Manager of Communications and Electronic Equipment Sales for RCA. Formerly manager of the department for the Chicago area, Mr. Hopkins will direct sales of product lines which include broadcast, television, test, scientific and electronic equipment. He is a graduate of Ohio State University and a senior member of the I.R.E.

Other appointments recently announced by RCA include those of *C. M. Lewis*, who succeeds Mr. Hopkins in the Chicago area: *Al Josephson* in the New York region, and *H. V. Somerville* in the Cleveland territory

* * *

Appointments of several sales executives and a wholesale branch manager, effective January 1, were announced by the Eastman Kodak Co. *Theodore F. Pevear* has been named assistant general sales manager, and *Thomas M. Connors* becomes manager of the New York Branch, succeeding *Edward T. McDermott*, who retires after 51 years of service with Kodak.

William S. Allen has been appointed manager of the Amateur Accessories Sales Division in Rochester; *Martin H. Donahoe, Jr.*, manager of the Amateur Still Camera Sales Division, and *Richard D. Lorbach*, manager of the Chemical Sales Division.

Glenn W. Mentch has been appointed manager of the Sales Service Division, effective January 1. Since January 1, 1946, he had been assistant manager of the division.

Bert Sanford Heads Altec Sales

Bert Sanford, pioneer picture man and active in the sound equipment and servicing fields for many years, has been appointed Theatrical Sales Manager representing both Altec Service and Altec Lansing corporations. Bert will act as liaison between the Altec companies and the theatre supply dealers and sound equipment manufacturers to stimulate more widespread use of Altec products and establish even closer relationship between the merchandising elements in the field.

Bert's nation-wide contacts with the industry's technical forces, and particularly with projectionists, is attested to by various life memberships voted to him by I. A. locals and his recent election as an honorary member of the 25-30 Club of N. Y. City.

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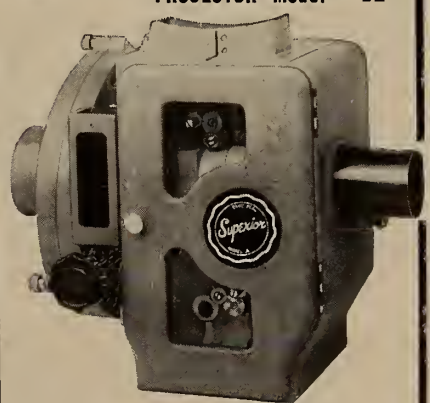
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Outstanding among many fine displays at the recent joint TESMA-TESDA Trade Show was Altec Lansing's utilization of an eye-catching item known as the "Iron Lung," shown in the accompanying photograph.

This device, which is practically a miniature model of the mechanism of the Iron Lung now used by the medical profession for treatment of severe cases of infantile paralysis, was designed to provide continuous actuation of two speaker diaphragms by



means of pulsing air pressure. It consists briefly of a lucite case housing the mechanical apparatus and the speaker diaphragms under observation. The driving motor and associated apparatus is geared so that each revolution of the motor causes an air pressure pulse which simultaneously actuates each of the speaker diaphragms mounted on a supporting lucite shelf.

In its operation the "Iron Lung" gives a visual demonstration of the fact that the diaphragm on the right, which is the Altec Lansing 288 speaker diaphragm incorporating tangential compliances, allows three times as great an excursion with the same amount of driving energy as the ordinary diaphragm of the annular compliance type shown on the left. Translated into terms of loudspeaker operating characteristics, it means that the tangential compliance construction, as incorporated in Altec Lansing 288 speaker diaphragms, increases the safety factor and sound reproduction abilities three times greater than ordinary annular compliant type diaphragm.

The demonstration attracted continuous attention and showed in fine style the advantages of tangential compliance construction in speaker diaphragms.

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Hertner also makes complete lines of m.-g. battery chargers for industrial trucks, as well as m.-g. sets for the 'phone industry, and will soon introduce a complete line of NEMA integral polyphase motors.

Best wishes for 1947

from

Detroit Motion Picture Projectionists Local No. 199
I. A. T. S. E.

Guessing



can be expensive

Guessing can be expensive at any time but particularly so today with the present limitations on new projection room equipment and with the uncertainties of replacements. Every projectionist should know the whys and wherefores of his equipment. He should know what to do and what not to do when the equipment fails to function properly—and how to keep the show going until the service inspector arrives at the theatre.

PROJECTIONISTS' SERVICE MANUAL is a complete, compact compilation and a valuable reference work. All items therein are grouped according to classifications and contain sound practical suggestions relating to the many projection room troubles—their causes and how to remedy them.

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December 12, 1946

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I sincerely hope that it will not be too long before we will have E-7's in our Pix Newsreel Theatre, because then, all three of our theatres will have the best in projectors, and break-down worries should be a thing of the past.

Kindest personal regards.

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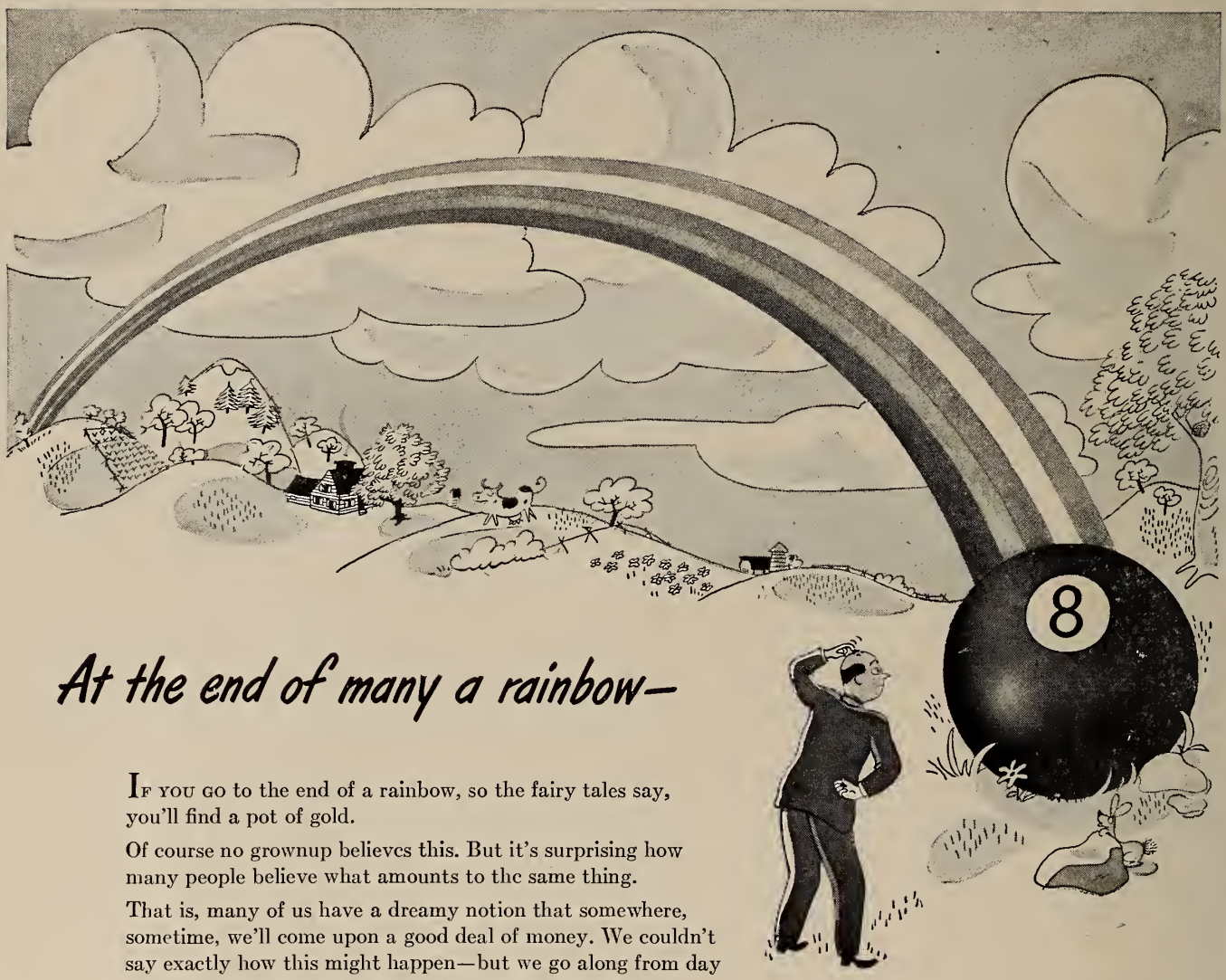


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FEBRUARY 1947

VOLUME 22 • NUMBER 2

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At the end of many a rainbow—

If you go to the end of a rainbow, so the fairy tales say, you'll find a pot of gold.

Of course no grownup believes this. But it's surprising how many people believe what amounts to the same thing.

That is, many of us have a dreamy notion that somewhere, sometime, we'll come upon a good deal of money. We couldn't say exactly how this might happen—but we go along from day to day, spending nearly all we make, and believing that *somehow* our financial future will take care of itself.

Unfortunately, this sort of rainbow-chasing is much more apt to make you wind up behind the eight ball than with a pot of gold.

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HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

PROJECTIONISTS will be astonished to learn that they, as a craft, are solely responsible for keeping television out of motion picture theatres. This startling bit of intelligence was conveyed to the trade by Paramount Pictures Corp. as the finale in a series of events which, whatever their contribution to motion picture technology, were not without humor.

The playlet opened upon the arrival in New York of Loren L. Ryder, director of recording for Paramount and newly-installed prexy of the Society of Motion Picture Engineers. Acceding to the idea that he meet and exchange chit-chat with the trade press, Ryder donned his S.M.P.E. mantle and divested himself of the following pronouncements anent theatre television:

1. Video in picture houses is entirely feasible at the moment, and 1947 will see tele on full-size screens in several of the de-luxe theatres.

2. "Commercially satisfying" pictures photographed from cathode tube images would be perfected and introduced into key-city big theatres during 1947, with special events hogging the early programs.

Developing his thesis, Ryder predicted that theatre tele will pass through four stages of development: first, the intermediate stage during 1947; second, the installation of special theatre video equipment, which promises to be quite expensive; third, the use of special screens equally suitable for video or motion picture presentation; fourth, tele projection by light rather than phosphorescence.

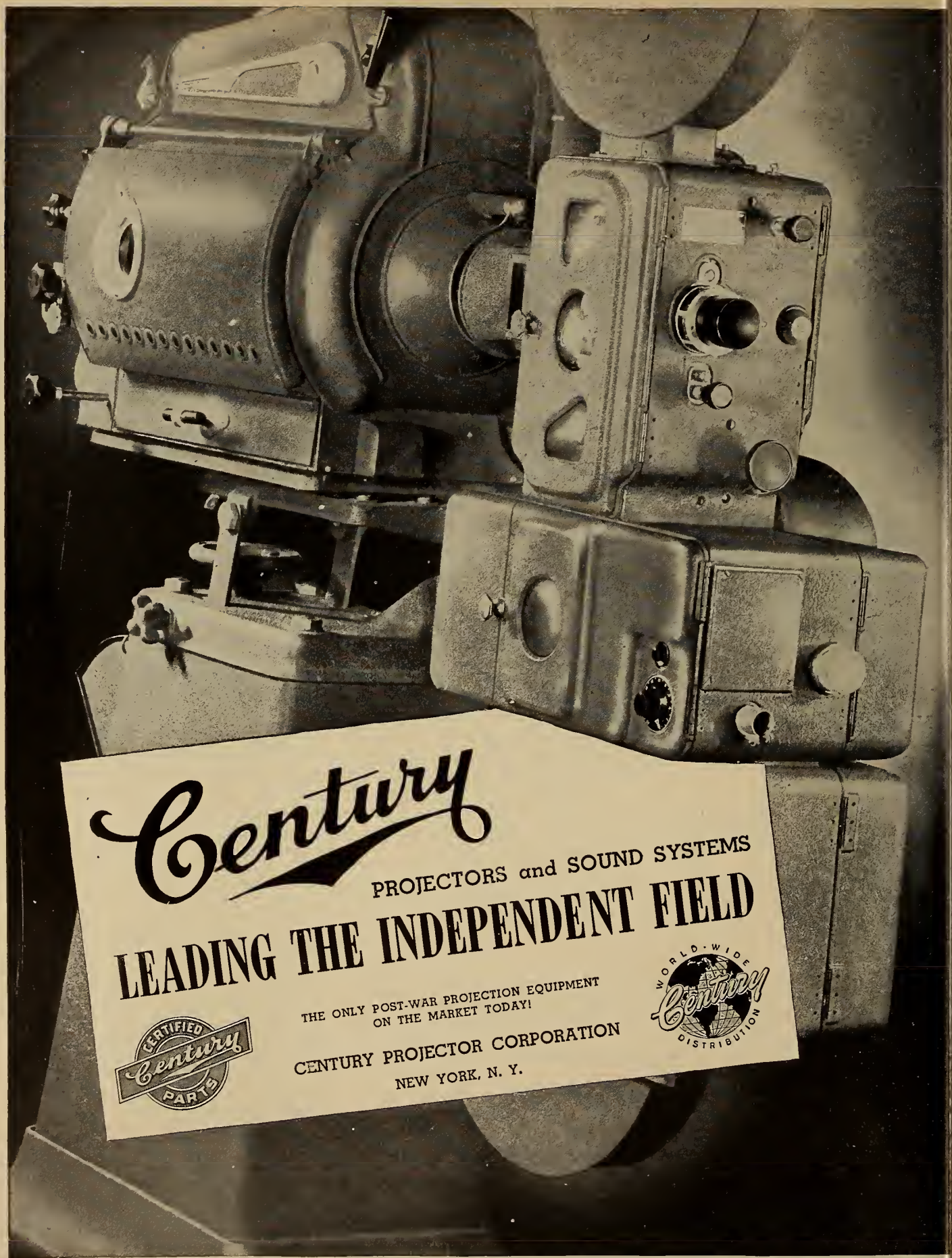
Conscious of Ryder's eminence in the Paramount scheme of things technological, *Variety* checked through the Par home office top officials in an effort to ascertain whether Ryder was reflecting the views of Par's brass. The latter agreed with Ryder estimate of video's imminence, but hurriedly added, according to *Variety*, that "opposition from projectionists' Unions make their introduction an unknown quantity."

This "opposition" takes the form, says Par, of you projectionist guys insisting upon handling the "intricate transition" from cathode image to the projection of the film, which job, adds Par, is held by video executives to require the "expert" ministrations of "tele engineers".

Now, this is the same guff that is spread so assiduously by the broadcasters in an effort to stave off unionization of the tele field. In I. P. for Sept., 1946 (p. 3) we commented on the anguished cries of tele broadcasters for "expert engineering talent" (as opposed to Union Labor) in the following words:

"I. P. will endorse the foregoing provided there be some foreseeable

(*Continued on page* 34)



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INTERNATIONAL PROJECTIONIST

VOLUME XXII FEBRUARY 1947 NUMBER 2

'Quality' vs. 'Pleasing' Sound Reproduction

By J. MOIR

IT IS common experience that the majority of the public prefer tone controls in the position that minimizes the "top" response. Discussion of this practice has probably occupied more time at engineers' "sound quality" lectures than any other single problem. The generally accepted explanation is that the public does not like the amplitude distortion introduced by the average sound reproducer, preferring the lesser evil of "top cut."

There can be no doubt that the effects of amplitude distortion, surface noise, sideband splash, *etc.*, are minimized by "top cut," but a feeling that other reasons, possibly more fundamental, may lie behind such a universal practice led the writer to consider other possibilities.

To put the problem into its proper perspective we must have a clear understanding of our target! Is it the engineers' job to produce "pleasing reproduction" or a *perfect reproduction* of the studio performance?

Public Prefers 'Top Cut'

Purists will probably consider as rank heresy the implied suggestion that "pleasing reproduction" and a "perfect reproduction" are not the same thing; but the writer cannot see any reason for agreeing with this view. To do so would imply that the present range of musical instruments had reached perfection.

Irrespective of the engineers' decision on this point, the public, knowing little of the fundamentals involved. will choose to have the "most pleasing" reproduction whenever the engineer places the choice in their hands. The public, having given the answer to these problems in no uncertain voice, and as it is certainly not the answer an engineer would expect, we must make an honest endeavor to decide whether the particular choice has been made because of defects in the engineering or because of some more fundamental factor.

It cannot be disputed that amplitude distortion leads to a tendency to restrict the frequency range, if that facility be available. This is perfectly reasonable, for a reproducer with a range extending to 10,000 cycles per second will reproduce up to the 20th harmonic of a 500-cycle note; while a reproducer having a range up to 3,000 cycles per second can only deal with the 6th harmonic of the same note. The chance of dissonance between two notes increases with increase in their harmonic content, owing to beats between harmonics.

Use of the "top cut" control will therefore decrease the unpleasant effects of amplitude distortion, and it is to be expected that its use would be more effective when a combination of instruments is being reproduced because of small differences in the tuning of individual instruments producing beats between the higher harmonics.

Let us consider the results of a recent series of tests in which a reproducer of the highest caliber was used to determine the frequency range which would produce the most *pleasing* reproduction.

These tests were very extensive in that separate comparisons were made

When asked what he thought of Law and Order, the sheriff of a Western frontier town of years ago replied that he guessed it was all right but he had never seen any. This is most apropos the unceasing discussions among engineers and laymen alike relative to the "proper" frequency range of sound reproducing means, whether it be a musical instrument, a radio, or a sound film reproducing system.

Glib pronouncements anent "high fidelity" reproduction ranging from 30 to 10,000 and more cycles is just that: even if a reproducer were that good, it still wouldn't impress the general public, whose taste has been often correctly tabbed as strongly on the "low-frequency" side. Ten years ago a radio manufacturers' survey revealed that radio set owners invariably suppressed the high frequencies in favor of the "bassy" lows.

Various aspects of this question are discussed in the accompanying article by a foremost British sound engineer who has done much original research on the topic.

on a wide variety of program material, with a series of frequency range restriction filters giving the frequency characteristics shown in Fig. 1. These were chosen as being representative of a system of the highest caliber (3 db. down at 30 and 9,000 cycles); an average quality radio receiver (3 db. down at 160 and 3,500 cycles), and a receiver midway between these limits (3 db. down at 70 and 6,500 cycles).

Representative Audience Chosen

Particular care was taken to eliminate the possible effects of such secondary factors as order of presentation, appearance of the loudspeaker, effect of signal lights, *etc.* High-quality disc recordings have the advantage of consistency and repeatability, and as a separate test indicated that the results were not appreciably modified by their use, discs were employed for the majority of the tests.

The audience chosen (about 500 people) was representative of a wide variety of possible tastes. It might be expected that a specialized group of listeners, such as those owning FM receivers, would display a more elevated taste than the ordinary listener, who might reasonably be expected to be accustomed to something worse than the narrow-range reproducer.

High-quality reproduction is one of the main advantages claimed for FM technique and steps are taken to make certain that the receivers meet this claim. The even more specialized group of listeners composed of professional musicians accustomed to hearing music, *etc.*, "in the natural," might be expected to exhibit an even more refined taste. Separate tests were therefore taken on a group of people owning FM receivers and on a group of musicians.

A wide variety of program material was made available, separate tests being taken of each type.

The results were surprising, to say the least. When wide range is compared directly with the medium range, the latter scores in eight out of the eleven comparisons, wide range failing to make

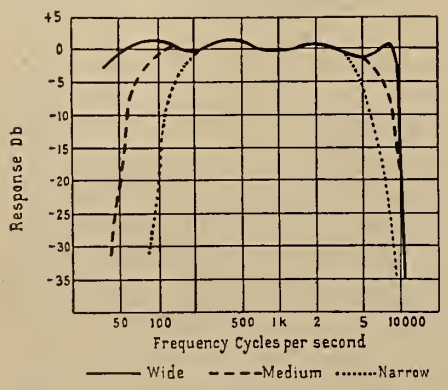


FIGURE 1. Frequency characteristics used for quality judgment.

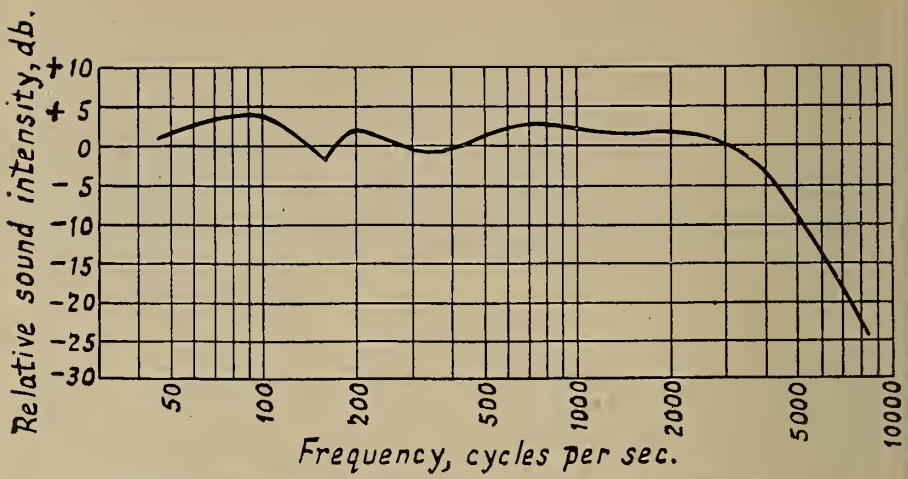


FIGURE 2. Overall frequency characteristic (adjusted for best aural results).

a decisive score at any point. On the tests where wide range might be expected to score (musicians and FM listeners), it is in fact most decisively rejected, the musicians being particularly single-minded in their rejection.

On comparing wide range with narrow range, the result is found to be almost as emphatic, narrow range scoring in nine out of the eleven comparisons!

Quality Adherents 'Miffed'

The results of the comparison between medium range and narrow range does a little to restore the engineer's self-confidence, in that medium range scores in seven out of the eleven tests, with one match drawn, and a large percentage of the audience having no preference. The results cannot fail to surprise the quality enthusiast, particularly as it should be noted that the usual accompaniment to "high fidelity" — surface noise, monkey chatter, whistles, *etc.*— were absent.

In another field there is further evidence of the advantages of operating a sound reproducer with a drooping frequency characteristic at the upper end. Fig. 2 indicates the overall frequency characteristic recommended by the Academy of Motion Picture Arts and Science after careful comparison tests in several theatres. Our own experience confirms this choice.

In the space available for an article of this nature it is not possible to quote further evidence in favor, so we will conclude this section with the assumption that after every effort has been made to reduce distortion, noise, *etc.*, to a minimum, *the human ear still prefers the frequency range to be restricted at the upper end of the scale.*

A critical review of the evidence quoted in favor of this viewpoint will immediately raise some points on which the evidence is not so conclusive as is really desirable. In the test results quoted there were no distortion or frequency characteristics taken on the specific set of speakers used for the test, though they were stated to be units of the highest quality, and a group of expert listeners agreed on the excellence of their performance.

After making a close study of the human hearing mechanism, the writer feels surprised that 5 per cent distortion is detectable, as an addition to the really serious distortion occurring within the ear. In this respect it is worth noting that the tone quality (harmonic content) of almost every instrument *varies enormously with loudness in normal playing*, yet little impression of unpleasant distortion is given.

If our electro-acoustic equipment is really distortionless (*i.e.*, if 1 or 2 per cent is of little consequence) one is immediately led to consider whether the same preference should be shown for restricted top response if electro-acoustic equipment were not involved as a link between instrument and listener.

Instrument Tone Characteristics

Now it would be ridiculous to assume that the frequency response of a violin, for example, was the only factor that determined tone quality, but there is no doubt that it is a very important factor. This question of violin tone quality has been the subject of a very thorough (but as yet uncompleted) investigation by a group at Harvard University.

The results thus far are illuminating. Good violins are characterized by a response which falls off fairly rapidly above 4,000 cycles per second; while the bad models have a response which is well maintained up to, and beyond, 6,300 cycles. At the low-frequency end the good models are again characterized by a well maintained output; while the response of the bad models fall away in much the same manner as a poor amplifier.

In a good instrument the lower tone will thus be rich and full with prominent partials (or harmonics); while the upper notes will tend towards pure tones, or

(*Continued on page* 27)



In Screenfare as in Warfare

CROSS HAIR ACCURACY

is necessary to satisfactory results

To consistently maintain optical accuracy far beyond the requirements of actual theatre needs, each Strong Reflector receives precision arc lamp tests.

Here is a scene in the Strong laboratory wherein lighting engineers and optical specialists make supplementary spot checks of these accurately formed mirrors. A tiny ray of light is projected progressively to various zones of the reflector, as it is rotated so to detect even the slightest divergence of this ray of light as it is reflected to the cross hair at the target.

The ceaseless efforts of these technicians to develop the best possible projection lighting equipment accounts in a great measure for the unchallenged leadership of Strong products. It is their magnificent job of coördinating the functions of lamps, rectifiers and reflectors that has made it possible for you to offer your patrons the best in screen presentation at a cost that you can well afford. The Strong Electric Corp., Toledo 2, Ohio.



When the lamps are **STRONG** *the picture is bright!*

Simultaneous ALL-ELECTRONIC Color Television

The appended article comprises the latest progress report on color television and the first on the new simultaneous all-electronic system, as published in the RCA REVIEW (Dec., 1946). Basic design and operating characteristics are reviewed, and the apparatus for scanning color slides and color motion picture film, together with the receivers, are described.

IN October and November, 1946, the Radio Corporation of America gave several demonstrations of color television to press, industry and Government groups. These demonstrations constituted a progress report on the work done in color television, which follows the program announced at the time of earlier demonstrations in December, 1945. In the current demonstration, important advances in color television were shown.

The new system is *all-electronic*, having the potential flexibility inherent in electronic arrangements, and is also *simultaneous*, all three color images being transmitted continuously. This system has many operating and performance advantages and is compatible with the present black-and-white television. Since each of the three color channels employs the same standards as those now in use for black-and-white transmissions, the green channel is suitable for monochrome presentation.

Color television of this type can be introduced at any time it is made ready and can be operated interchangeably with black-and-white television; undesirable obsolescence is not created.

The recent demonstrations included television pictures in natural color scanned from Kodachrome slides and from 16-mm color motion picture film. In order to demonstrate interchangeability, pictures in monochrome using signals of present black-and-white standards were shown on the color receivers; pictures in monochrome, using signals of the simultaneous color transmission, were then demonstrated on a current model black-and-white receiver.

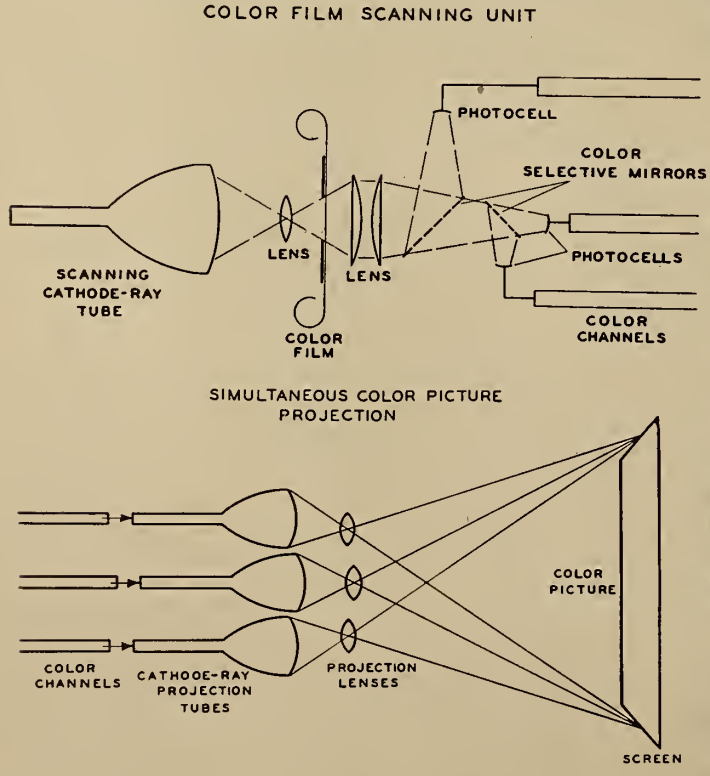


FIGURE 1. Block diagram of the simultaneous all-electronic color television system. Each of the color channels, shown at the right of the upper figure, have the same operating standards as the current black-and-white system. At the receiving end, shown at the left of the lower figure, each color channel is associated with its separate cathode-ray projection tube.

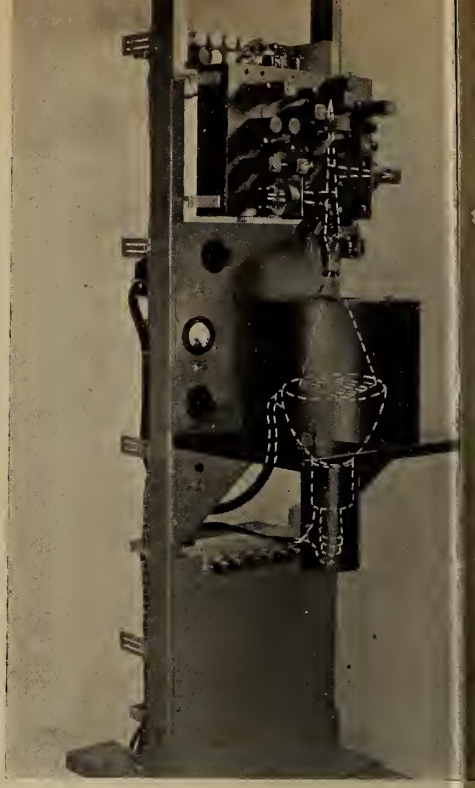


FIGURE 2. Stationary picture signal generator.

Research work is under way and progress is being made in the radio transmission and reception of simultaneous all-electronic color television and in the building of television cameras for studio and outdoor pickup of this system. This work together with propagation tests and field surveys, is a part of the overall schedule yet to be fully worked out, but already well along.

Since simultaneous all-electronic color television is of far-reaching importance, the experimental equipment used during the recent demonstrations is described herein. This includes the apparatus for scanning color slides and color motion picture film together with the television receivers for color. Some of the basic design and operating characteristics are also reviewed. Fig. 1 is a block diagram of the system.

Picture Signal Generator

One of the primary needs for the development of a simultaneous color television system is a standard source of tricolor video signals on which one may rely for good resolution, good registration, high signal-to-noise ratio, freedom from spurious signals, and good color fidelity. A special slide scanner utilizing a cathode-ray tube as a flying-spot scanner, a beam splitter, and three photoelectric tubes, were developed for this purpose.

A photograph of this apparatus with a superimposed phantom view of the kinescope and the light paths is shown in Fig. 2. The raster formed on the screen of the kinescope is imaged on the



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slide by means of a lens. The light rays transmitted by the slide are condensed and then divided by dichroic (two-part) mirrors which pass one color of light and reflect the others.

The use of dichroic mirrors for a light splitter instead of half-silvered mirrors and color filters, reduces light losses and therefore provides a signal with higher signal-to-noise ratio. The divided light beams are further filtered by color-absorption filters, then collected by multiplier type phototubes which convert the varying light intensity of the spot as transmitted by the slide into video signals corresponding to the three primary colors of the slide.

The use of multiplier phototubes provides a high video input to the amplifier. The amplifiers are equalized to correct for the decay characteristic of the phosphor used in the flying-spot kinescope.

On the bottom of the rack in the photograph (Fig. 2) is the chassis containing the synchronizing, blanking, and deflection circuits for the flying-spot kinescope. Behind the kinescope is the high-voltage power supply which provides approximately 30 kilovolts for the kinescope and a first anode focusing potential variable between four and seven kilovolts. The flying-spot kinescope has a special short-persistence phosphor whose light intensity drops to less than 1 per cent of the original value in one microsecond. Facing the kinescope screen is the slide holder with an F:2 objective lens.

The whole optical assembly is mounted on the same chassis with the three video amplifiers. The beam splitter is at the lower end of this chassis, and a condensing lens system for each channel reduces the beam diameter to that of the photocell aperture after the beam is divided. The photocells are enclosed in shield cans, which also support the color filters.

The voltage for the phototube multipliers may be controlled by the variable power supply directly under the beam splitter chassis, and by this means the video levels of all three channels may be varied simultaneously. The supply voltage of the phototube multipliers of the individual channels may be varied individually by the potentiometers visible at the top of the chassis, to provide the desired color balance.

Each of the three video amplifiers contains three stages having a flat frequency response to approximately 5.5 megacycles. Included in each of the amplifiers are the equalizing circuits to compensate for the various phosphor persistences. The output level of the amplifiers is approximately 1 volt peak-to-peak. The small chassis above the beam splitter is for the insertion of the synchronizing signals in the green video signals.

The quality of the signal from this generator is highly satisfactory not only because of the high resolution, but also because the blacks have the unusual characteristic of being practically free from noise. Noise in the picture therefore has the general appearance of the equivalent effect found in motion pictures from photographic grain and dirt. The registration of the three signals is inherently correct.

Motion Picture Film Scanner

The motion picture film scanner was built with no attempt at refinement or optimum design, in order to hasten preliminary tests of reception with moving subjects. Its general scheme is the same as that of the slide scanner, with the film gate replacing the slide holder. The apparatus is shown in Fig. 3. A standard 16-mm home sound film projector was modified by substituting a synchronous motor drive so that the film speed was changed to 30 frames per second, instead of 24. Each frame was then scanned twice to give 60 fields per second.

The pull-down mechanism, which was unchanged, is so slow that it was necessary to blank approximately 30 per cent of the field time to avoid showing the distorted picture produced during the film pull-down time. The picture therefore actually contained only about 370 lines, although the nominal number of lines was retained at 525.

The picture quality was judged to be good, particularly when allowance is made for the fact that part of the picture area was missing, due to the compromise in design of the film projector. The sound was usable, but was not very satisfactory due to the improper film speed.

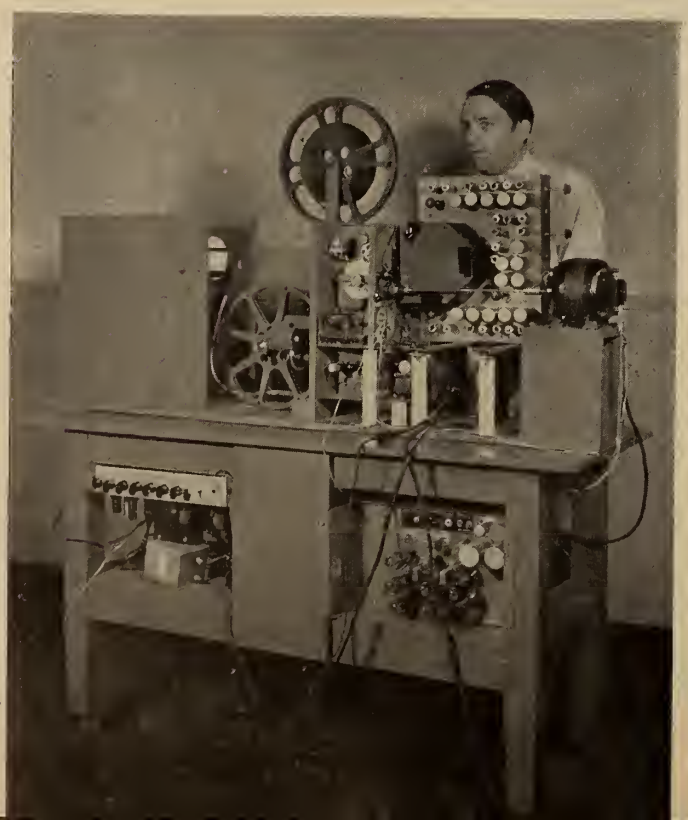
Reproducing Equipment

The picture reproducer, as shown in Figs. 4, 5, 6, contains three 3-inch kinescopes arranged side-by-side in an equilateral-triangular group, each having an associated projection lens and deflection yoke. The kinescopes are identical except that phosphors selected for producing red, green, and blue light, respectively, are used. The kinescopes and lenses are mounted in an assembly frame which also holds the yokes in such a manner that each yoke may be adjusted in rotation and height without disturbing the kinescope mounting position.

Each kinescope is provided with the video signal corresponding to its par-

FIGURE 3 (left). Motion picture film scanner.

FIGURE 4 (right). Laboratory model simultaneous all-electronic color television receiver.







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ticular primary color, and has a scanning raster which produces light for its primary color image in the completed picture. The lenses project these three pictures simultaneously to the translucent viewing screen by way of a 45-degree mirror, as shown by dotted lines drawn on the photograph (Fig. 6). The kinescopes are operated at a second anode potential of 25 kilovolts.

The optical system serves to focus and combine the three pictures on the translucent screen. In so doing, the images must not differ from one another in geometric distortion or location. Prevention of such difference is accomplished by placing the three kinescope faces in the same plane and mounting the three lenses above this plane, with their axes perpendicular to it.

The axis of each lens is offset from the center of the kinescope face toward the center of the assembly by an amount sufficient to bring the three pictures into approximate register on the screen. Exact registry is then obtained by moving the raster on the kinescope face electrically. This offset, which is similar to a rising front on a photographic camera, causes no distortion, but requires extra covering power in the lens. F:2 projection lenses are used. They are threaded into the lens plate at the calculated positions and the threads serve as the focus adjustment.

FIGURE 5. Receiver with three cathode-ray projection tubes, lenses removed.



The registration requirements are similar to those existing in color printing and color photography. Ideally, the three rasters should be identical and properly positioned within a fraction of the width of a scanning line. Practically, a considerable amount of misregistration may be present without being objectionable.

The scanning rasters are made substantially identical by using three similar yokes, and supplying them with power from the same deflecting circuit. The three yokes are connected in parallel rather than in series. This permits a simple individual centering or positioning arrangement and also insures more nearly identical deflection fields. In a series arrangement, one yoke would operate at a higher A. C. potential with respect to ground, and would thus be shunted to a greater extent by the stray capacitances.

The positioning or centering arrangements are the usual television centering circuits, the only requirements being that the centering supply voltage must be stable, and that adjustment of the potentiometers must not alter the current waveshape through one yoke with respect to that through the others. To insure the latter, the horizontal centering potentiometers are by-passed very lightly and the vertical ones are not by-passed.

Enormous capacities would be required to by-pass the vertical centering potentiometer properly. However, since the vertical circuit is essentially resistive, the addition of more resistance would simply change the amplitude, which is easily corrected.

Kinescope Registration

The procedure used in registering the kinescope assembly is as follows: the kinescopes are adjusted for the proper height and clamped; then the lenses are focused optically. The yokes are then rotated until the edges of the three rasters are parallel. One of the three rasters is then considered standard for horizontal size, and one of the others is adjusted to it by moving the deflecting yoke up or down. Although this, of course, varies the raster size both horizontally and vertically, only the horizontal size is considered during this adjustment.

This adjustment is then repeated on the remaining raster until the three horizontal sizes are alike. The vertical sizes are then adjusted by varying the value of small resistors in series with the vertical deflecting coils. The positioning or centering controls are then set to register properly the three rasters which are now of the same size.

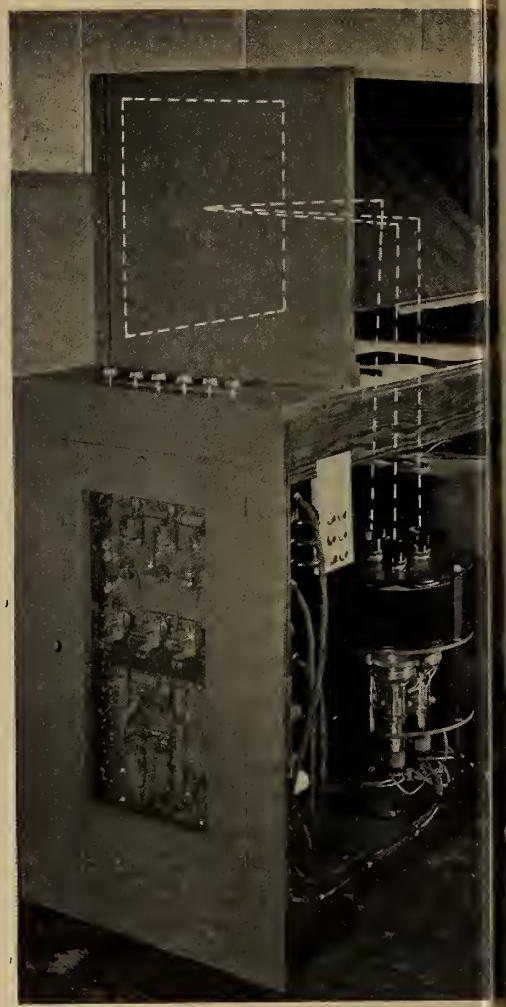


FIGURE 6. Receiver with lenses in position, showing projection paths.

Successful registry of the three rasters has been greatly facilitated by the use of aluminized kinescope tubes. The aluminum film insures that the phosphor screen and the glass wall are at second-anode potential and hence do not collect charges that will divert the electron beam erratically.

New RCA Regional Quarters

RCA Victor Division's New York and Chicago regional offices have moved to newer and larger quarters. The New York office, formerly located at 411 Fifth Ave., is now at 36 W. 49th St., Radio City; while the Chicago office, formerly at 445 N. Lakeshore Drive, is now at 666 N. Lakeshore Drive. Regional office managers are M. F. Blakeslee, in New York, and H. A. Renholm, in Chicago.

IZZY PERSE, SUPPLYMAN, DIES

Isadore Perse, 62, for many years head of the Capitol Motion Picture Supply Co. on New York's Film Row, died of a heart attack January 26 at his Miami Beach, Fla., home. Funeral services held in N. Y. City on January 31 were attended by a host of industry representatives. Mr. Perse is survived by two sons, Benjamin and Harry, who will carry on the supply business; two daughters, two sisters, and three brothers.

Test EQUIPMENT for Theatre SERVICING†

By EDWARD STANKO and PAUL B. SMITH

First publication anywhere of data anent this new RCA Theatre Test Kit was in I. P. for July, 1946, Section 2. Additional detailed information about this equipment is contained in the accompanying article, which also outlines the underlying reasons for the need of new and modern test equipment for properly servicing theatrical equipment with the minimum expenditure of time.

THE continual improvement of motion picture sound equipment, with its increased fidelity, imposes more rigorous requirements on the field test equipment necessary to maintain its circuits and its optical and mechanical parts in their original condition and adjustment. Also, this new field test equipment must be easily portable if it is to be of maximum usefulness. Fortunately, there are now available miniature tubes and other parts, developed during the war, which contribute materially to this requirement.

During the war, instrument research has been greatly accelerated. The advent of alnico magnets has made possible stronger magnetic fields, more rugged moving systems, and higher torque springs, all of which contribute to accuracy, ruggedness, and reliability, as well as lighter weight. Miniature tubes have been developed which can stand the shock of being fired from a gun in an anti-aircraft shell. Tubes incorporating these developments will withstand the shocks incident to use in portable equipment much better than prewar tubes.

With these things in mind, a new 1946 model test kit has been designed, consisting of a varnished, reinforced fiber case, with compartments for the various instruments. When the lid is closed, these instruments are held firmly in place. The case is 19 inches long, 7½ deep, and 14 high when its carrying handle is folded. Including all instruments, it weighs 35 lbs.

The case contains an RCA VoltOhmyst especially designed to operate on self-contained batteries instead of on A. C., which was required for previous models. A neon pilot lamp is connected to the batteries through a resistor-capacitor network and the selector switch, and flashes repeatedly when the batteries are in use. This effectively attracts attention, and consumes only a few microamperes of battery current.

VoltOhmyst Applications

The VoltOhmyst can be used to measure D.C. voltages from 0.10 to 1000 volts over six ranges, with an error of less than 2 per cent of full scale on each range.

Measuring is accomplished by a two-tube, balanced-bridge circuit which permits a constant, high input resistance of 11 megohms on all ranges, and protects the instrument moving system from burnout should excessive voltage be applied. Because the normally negative lead is grounded to the instrument case, a reversing switch is provided to allow measurement where the ungrounded side of a voltage source is negative.

The high-side input probe incorporates a 1-megohm isolating resistor, thus permitting measurements to be made in signal-carrying circuits without adding a serious lead capacitance which might introduce excessive circuit loading or distortion.

The resistance meter also utilizes the bridge circuit and can be used to measure resistances from 0.1 ohm to 1000 megohms over six ranges. A 3-volt, heavy-duty battery furnishes voltage for all ranges. The voltage applied to the part being measured does not exceed, and is usually much less than, 3 volts; this is of advantage when small lamps, alloy-steel core transformers, and other items susceptible to damage by excess current are to be measured.

Because the bridge circuit isolates the meter moving system from the measuring circuit, accidental connection of the ohmmeter leads to a live circuit or to a charged capacitor will not result in instrument burnout. The resistances themselves are rugged enough to withstand a large momentary surge or overload without damage.

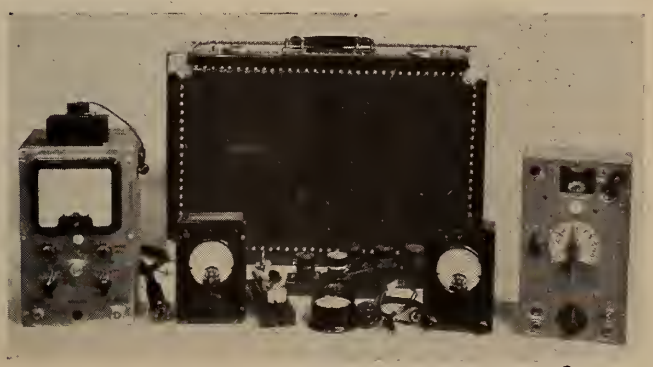
The special VoltOhmyst can be used to measure A. C. voltages of commercial and low audio-frequencies from 1 to 1000 volts over five ranges. When so used, it becomes a conventional copper-oxide-rectifier voltmeter with a resistance of 1000 ohms per volt. No series resistor is used in the A. C. leads. The measuring circuit is isolated from the case ground, when alternating voltage is measured.

This special VoltOhmyst also measures D. C. from 100 μa to 5 amps, over six ranges, with accuracy of $\pm$ 2 per cent of full scale, by the use of shunts on the meter moving system. The measuring circuit is isolated from the case ground when measuring current.

Socket Selector Kit

A standard socket selector kit with a complete complement of adaptors and sockets, including those for the new 7-prong miniature tubes, is furnished for analysis of tube circuits. Two pin jacks are installed in the top of the special VoltOhmyst described previously: these provide for mounting the socket selector block on the top surface of the VoltOhmyst. Connections are readily made to the socket jacks with the standard VoltOhmyst leads.

When the sockets and adaptors are not in use, their prongs are pushed into rubber-lined dummy sockets in three wooden carrier blocks which are then slid into corresponding slots in the carrying case. The soft rubber dummy socket hole linings grip the prongs firmly but easily. This facilitates accessibility of



Compact pastwar RCA theatre service kit. Left to right, in faregraund, are battery-aperated Voltohmyst, power level indicatar, ammeter shunt, tube sacket selectars, D.C. ammeter, and triatic signal tracer and capacitar checker. Reinfarced fibre carrying case in background.

† J. Soc. Mot. Picture Eng., December 1946.

the sockets and adapters, and helps prevent loss or damage.

An A. C. voltmeter and decibel meter is furnished with the test kit. This instrument is smaller and lighter than the special VoltOhmyst and, since it can be used for A. C. voltage measurements from 0.25 to 150 volts, may serve as a pocket instrument.

This deoibel meter is necessary when testing personnel are making frequency response runs, transmission tests, gain or loss tests, amplifier overload checks, or similar system measurements. Instruction sheets are furnished with this instrument to enable the user to correct the readings should the instrument be used on lines of impedances differing from that for which the instrument was calibrated, or to convert the readings to those corresponding to a different zero level, or both. This voltmeter includes a series blocking capacitor which is to be used when the instrument is connected to a circuit carying both D. C. and A. C.

An A. C.-D. C. ammeter also is supplied. This instrument can be used to measure currents of from 0.1 to 15 amp, either A. C. or D. C., over two ranges. In addition, a pair of terminals is provided to connect to the leads from any standard 50-millivolt drop shunt, for measuring higher values of D. C.

The latter two instruments are held in place in the case by wooden blocks, and when the cover is closed, cannot shift or rattle around.

A 150-amp, 50-millivolt drop shunt is also furnished, which can be connected to the ammeter to enable measurements of D. C. up to 150 amps. This is necessary when adjusting arc lamp rectifiers, checking arc lamp ammeters, *etc.* This shunt is permanently mounted on a wood block which slides into a slot in the case adjoining those on which the socket selector adapters are mounted.

Triatic Signal Tracer

The Triatic Signal Tracer, a standard unit in the kit, was especially developed to fill a long-felt need for a universal tester. It will measure capacitators of values between 10 micro-microfarads and 80 microfarads, over three ranges, with an accuracy of 5 per cent or better. The signal tracer will also indicate whether the capacitor being tested has low or high shunt resistance.

Bridge balance is indicated directly by a 6U5/6G5 electron-ray indicator tube. The use of this tube eliminates delicate instruments or bothersome headphones, and the indication is not confused by any harmonics that may be present in the supply voltage.

It incorporates a three-tube, high-gain audio-frequency amplifier and a 3-inch PM speaker. The amplifier has approximately 100 db gain and a power output of 200 milliwatts. Its high impedance input (1.5 megohm) can be connected directly to a signal-carrying circuit without appreciably disturbing the signal. The volume control is in the input circuit; therefore, a high-level signal at the amplifier input can be reduced sufficiently to prevent overloading any part of the amplifier.

A series blocking capacitor in the input circuit prevents any D.C. voltage

(*Continued on page* 25)

Magnetic Recording, Reproduction Data

By G. T. CLEARS

Armaur Research Faundation, Chicaga

The recent flood of data anent magnetic recording presented before engineering sacieties and published in the technical press, notably I.P., indicates clearly that this navel recording and reproducing process is ready to play an important role in the entertainment field, bath far 35-mm and lesser gauge films. The appended nates were prepared especially for I.P. by the laboratory in which was dane much original research work on this system.

ONE important essential operation incident to magnetic recording consists of coating the motion picture film with magnetic particles in a cellulose base such that they may become affixed to the film. First experimental coatings consisted of a thin magnetic strip either outside the film perforations, or as a single strip on one side of the film. The former method permits two sound tracks to be utilized. It was found that should the film be coated prior to exposure, subsequent developing processes did not in any way affect the quality or composition of the magnetic medium.

Exact composition of the magnetic powder is still under considerable research by the Armour Foundation staff and undoubtedly will be improved from time to time.

While the first magnetic film was placed on a 35-mm film strip, additional work has been done on 16-mm and 8-mm as well. At existing film speeds, it has been found that the upper limit of response is approximately 14,000 cycles at the 35-mm film speed; 5,000 cycles for 16-mm film, and 2,500 cycles for 8-mm film. As with other types of magnetic recording, it is possible to erase or edit the recording as desired.

Record-playback heads were especially designed for this application and three heads were located on the projector such that the film would first pass through the erase head, then to the record-playback head, and finally to the monitor head. This would permit immediate monitoring of a new recording so that any necessary changes in volume level or microphone location could be made. It is possible, however, through a switching arrangement for the usage of only one head.

The design of the record-playback heads is also under considerable development and research work, as it is felt that a great deal of fidelity and dynamic range improvement still is possible.

Film Field Applications

Advantages of magnetic recording in the motion picture field include:

(1) Ease of editing by cutting or erasing;
(2) the possibility of re-recording should this be desirable;
(3) unlimited playbacks without deterioration of the recorded program;
(4) uncomplicated recording equipment that may be attached to contional projectors;
(5) simplicity of recording technique; and
(6) economical construction costs with response comparable to optical recording, including a low noise and distortion level.

Utilization of magnetic recording on motion picture film for amateur work may well become an important means of application, although the excellent fidelity that this system is capable of reproducing at 35-mm film speed may insure wide interest for its use in professional work.

Technically, when used with a 16-mm projector, a magnetic track .045 inches wide and .0005 inches thick is used. When only one side of the film is coated, the additional thickness does not cause difficulty in film reeling; however, a blank strip could be used as a balance if desired. When single-side sprocketed film is used, the magnetic track is located on the unsprocketed side. This allows a wider track and gives increased fidelity.

It is possible to add a magnetic track to film that has already been developed, thereby making it possible to include a commentary or musical background to finished films.

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TELECASTS

THE television industry was dealt a staggering blow recently when the owners of hundreds of apartment houses in New York City's lush home reception area notified tenants that they cannot use tele receivers in their homes because of complications in erecting suitable aerials for the sets. The realty men stated flatly that there was just not enough room on the roofs of multiple dwellings for the elaborate individual antennas required by present video sets.

Unlike radio, current tele sets require an antenna out in the open, including a pole 8 to 10 feet high with crossbars on top running approximately 4 to 8 feet, which must be attached to the parapet wall with a wire running down the front of the building to each apartment. Antenna adjustment is also extremely critical, costing from $35 to $50 over the purchase price of a set.

Reception of telecasts in apartments, said the realty men, would have to await the perfection of a master aerial system serving all tenants. Such systems have been produced, but none has yet gained industry-wide acceptance, the problem being to establish standards for matching any make of receiver to a central aerial circuit.

Realty circles pointed out, however, that the cost of a master aerial system would run into many thousands of dollars for even a comparatively small apartment house, requiring the insertion of wires behind plaster and careful shielding from other electrical circuits that might induce interference. Whether the expense would be passed on to the tenants enjoying the new service or absorbed by the landlord admittedly is a moot point.

* * *

Television in 30 metropolitan districts comprising 32.8 percent of the nation's population is already assured by the 57 licenses or station construction permits which have been granted by the F. C. C. for commercial television broadcasting, Walter L. Lawrence, RCA commercial engineer, told members of the American Institute of Electrical Engineers. Mr. Lawrence declared that "to furnish television broadcasting at the service standards required for commercial operation, all stations must provide reliable, consistent operation."

* * *

Present tele commercial markets are New York, Chicago, Philadelphia, Schenectady and nearby cities, reports the RCA *News Letter*, which adds that by the forepart of 1947 RCA video installations will be made in Washington, Los Angeles, Detroit, St. Louis, Dallas-Fort Worth, and Baltimore. By mid-1947, continues the *News Letter*, more than 30 million people will be within effective service range of telecasts.

By early 1948 RCA expects to have other tele transmitters in Hartford, Providence, Trenton, Seattle, San Francisco, Los Angeles, Boston, Salt Lake City, Albuquerque, Cleveland, Miami, Omaha and Toledo.

* * *

The S.M.P.E. has its back up over the re-allocation of television frequencies proposed by the F.C.C., charging that the change would "stifle technological development" and deprive the American people of theatre television. The engineers' views were disclosed by Paul J. Larsen in an oral statement before the F.C.C.

'Monopoly' Relay Circuits

The intended assignment of the 1,000 to 13,000 frequency bands to non-Government fixed and mobile services was blasted by Larsen, who stated that unless the F.C.C. definitely classifies theatre tele as a "common carrier" service so that it would be included in the allocation of frequencies, experimentation for large-screen video for film houses will be effectively and disastrously blocked.

Referring to inter-city relay service, Larsen pointedly asked whether the F.C.C. meant to limit such programming on a national scale to "coaxial or waveguide circuits which are technically . . . controlled by a single organization". This query was widely interpreted as a thrust at A. T. & T., which controls such facilities. Larsen made two recommendations on behalf of the S.M.P.E.:

1. Classify under a basic radio facility a theatre tele service which involves communication of a private nature.

2. Retain present non-Government fixed and mobile experimental bands in the frequency spectrum between 1,000 and 13,000 megacycles on the same basis of experimental authorization to all services as previously allocated.

* * *

THEATRE operators will face television competition sooner than many think, according to "Theatre Facts," official organ of the Allied Theatre Owners of Indiana. Summarizing television developments during the past year, the unit's publication makes the "conservative" prediction that within 4 years video *networks* will be serving more than 80 percent of the population.

The first impact on the box office will be severe because of the novelty factor, continues "Facts," and thereafter a continuing increase in sponsored programs will justify the ever-increasing purchase of sets, which in turn will justify the presentation of top talent.

Citing possible means of "defense," Indiana Allied recommends an "early investigation of receivers" (what ever that means) and the "encouragement of projectionists to learn as much as possible about the video art," looking toward the use of television in the theatre.

* * *

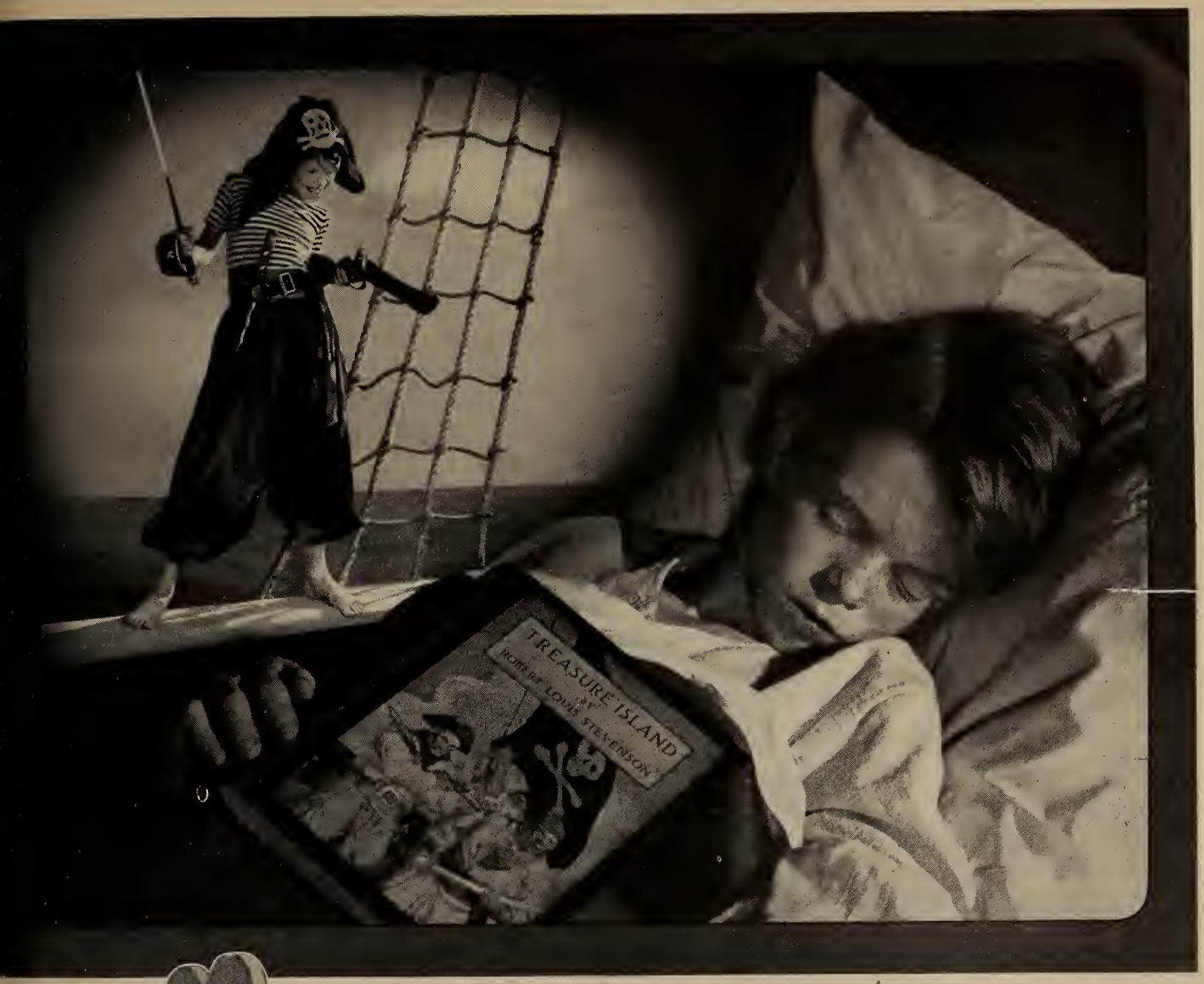
"Television will be our oyster editorially," stated Dan Doherty, assignment editor of Fox Movietone News, before a meeting of the SMPE Atlantic Coast Section. Because of the techniques developed for covering the news in picture and sound, existing newsreel services can be expected to handle the job with high accuracy and speed, said Doherty, who added:

"Whether the news goes on a theatre screen or a television receiving set, we are set up to do a great job. Engineers have produced the equipment to make television possible, and we have the editorial acumen and technical know-how to use these tools."

S.M.P.E. 61st Convention Set For Drake Hotel, Chicago, April 21-25

The 61st Convention of the Society of Motion Picture Engineers will be held at the Drake Hotel, in Chicago, April 21 to 25 inclusive. Major emphasis will be placed on various aspects of narrow-film motion pictures, including television and other applications, and on all phases of studio and stage techniques applicable thereto.

Members and others planning to present papers at the Chicago meeting should submit the title and an abstract of the paper, together with the author's name, address and affiliation, not later than March 15 to Gordon Chambers, Eastman Kodak Co., Rochester, N. Y., chairman of the papers committee, or to the offices of the Society at Hotel Pennsylvania, N. Y. City. Complete manuscripts in duplicate must be received by April 7.





Maker of dreams . . .

• To make dreams like this convincing . . . to show them with the smoothness that brings life and reality . . . that is the job of the optical-effects man.

Yet it is only one of his many contributions to modern pictures. By his skill with the optical printer . . . his production of fades and wipes, of dissolves and laps . . . he plays an important part in giving American movies their high standard of technical excellence.

If the optical-effects man is to play this part to the full, he must use dependable film of superior quality. That's why he usually prefers to work with the large and well-known family of Eastman motion picture films.

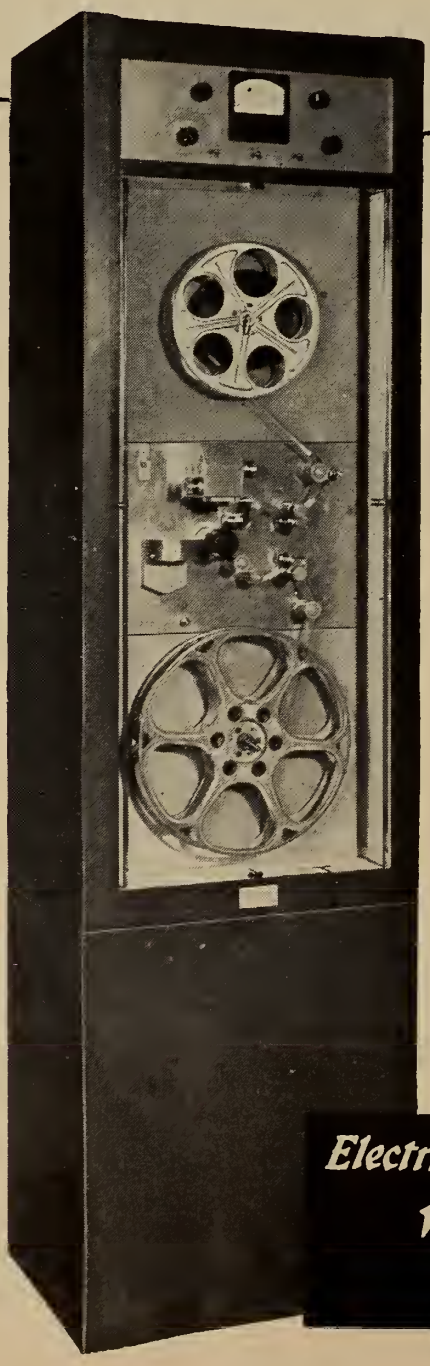
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NEW

Re-recorder by *Western Electric*

makes re-recording better and easier



8

outstanding features of the new RA-1251 RE-RECORDER

1 With it, you keep flutter down to no more than 0.05% in any particular frequency band and total flutter down to no more than 0.07%.

2 You can play all types of film tracks: variable area or variable density, 100 mil standard, 100 mil push-pull or 200 mil push-pull. The scanning slit covers all existing types of 100 mil and 200 mil tracks without moving optics or film. Visual inspection of scanning is provided for.

3 It's easy to adjust accurately the film start mark to scanning beam.

4 The method of vernier synchronization provides accuracy of better than one sprocket hole.

5 During threading, Automatic Loop Setter enables you to lock movable rollers to mid-point operating position, thus assuring accurate setting of loop.

6 You're assured of low distortion by highest quality photocell amplifier. Plug-in mounting is handy.

7 Re-winding is simplified. Automatic Re-wind Cutoff has separate motor, which cuts off when film is re-wound. You can adjust speed of re-wind.

8 You can watch operation through glass doors that keep out dust.

This radically different re-recorder is the result of an entirely fresh approach to the complex problem of re-recording sound on film.

Engineers of Western Electric's *Electrical Research Products Division* talked with studio technicians—studied their re-recording methods and difficulties—found out where previous equipment could be improved.

Then they designed the RA-1251 to meet the technician's needs and specifications. It marks a tremendous step ahead in appearance and compactness—in efficiency, accuracy, speed and ease of operation—in quality of reproduction!

It is one more evidence of Western Electric's continuing contributions to the technical progress of the industry.

Electrical Research Products Division
OF
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233 BROADWAY, NEW YORK 7, N. Y.
Hollywood Office—6601 Romaine Street

The Strong 16-mm (28 V—30 A) Arc Lamp

NO MORE definite indication of the emergence of 16-mm projection equipment from the "swaddling-clothes" stage is needed than the adaptation to such units of the high-intensity carbon arc lamp. Extreme portability, ease of setting up and operation, and long running time for a single reel have always been positive advantages of 16-mm equipment.

Now, the advent of a high-intensity carbon arc light source greatly expands the effective competitive range of the heretofore sub-standard units by comparison with 35-mm projection.

Outstanding in the 16-mm field in terms of vastly increased illumination of a superb character (color) is the new 16-mm carbon arc projection lamp developed by Strong Electric Corp., of Toledo, Ohio. No serious technician can ignore the potentialities of a 16-mm equipment which delivers, while running, 1000 lumens of quality light Harry Strong, president of Strong Electric Corp., tells the story of this new lamp:

Carbon Characteristics

By experimentation, it was determined that a 30-ampere high-intensity arc produced the maximum amount of light that could be projected without buckling the 16-mm film, even though protected by heat-absorbing filter and air-blast.

Since one hour is the running time of a 2000-foot 16-mm sound reel, a carbon burning time of one hour without retrimming was established. This requires a positive carbon 6 mm. in diameter and 8½ inches long, and a negative carbon 5½ mm. in diameter and 6 inches long. This special color-modified high-intensity, copper-coated carbon trim is marketed under the trade name of Pearlex.

A reflector 10¼ inches in diameter, with a geometric focus of 4 inches, is set 16 inches from the film aperture, resulting in an *f* value of 1.6, which matches the *f*:1.6 lens commonly employed in the most modern 16-mm portable projectors.

Standard Lamphouse Design

The lamphouse follows standard theatre practice in design but is built in diminutive proportions. There are horizontal, vertical, and focus adjustments for the reflector; manual controls for the carbon alignment; an adjustable-speed motor for feeding the carbons; an arc imager; an ammeter for reading the current at the arc; and individual supports close to the arc for guiding both the positive and the negative carbons.

The 8½-inch positive carbon, which is in horizontal coaxial alignment with the 6-inch negative carbon, the 10¼-inch diameter of the reflector, as well as the control motor and ammeter, have all determined the physical dimensions of the lamp, which are 23 by 13 by 13 inches, with a weight of 50 pounds.

Power Supply Data

The direct-current power for the 28-volt, 30-ampere arc is supplied by a single-phase, full-wave rectifier in which are used two 15-ampere Tungar tubes. The live parts of the lamp are effectively insulated from the grounded line circuit by the use of a separate primary and secondary winding in the main transformer. There is also a smoothing reactor which is connected in the direct current circuit to the arc: this reduces the a.c. component and light flicker.

Within the rectifier are also housed the necessary switches for manual adjustment of the current to the arc; an a-c line voltmeter; overload circuit-breaker; and the line relay, which is connected to the lamphouse door switch.



The new Strong 16-mm high-intensity d. c. carbon arc lamp, shown with its associated Tungar bulb rectifier equipment.

The a.c. load or rectifier input does not exceed the 15-ampere limit provided by any 110-volt convenience outlet. The rectifier is 20 inches high x 12 wide x 11 deep, weighs 100 pounds, and is provided with folding handles for easy handling and portability.

Sound Reproducing System Definitions

THE appended definitions of sound reproducing system terms was compiled by the engineering staff of the Tube Department, Radio Corporation of America, with due acknowledgement of the fact that many of the definitions are based on standards established by the Institute of Radio Engineers. Familiarity with these terms and their meanings should prove of great assistance to projectionists in the understanding and operation of sound reproducing equipment.

Amplification Factor: A measure of the effectiveness of the grid voltage relative to that of the plate voltage in affecting the plate current.

Amplifier: A device for increasing the amplitude of electric current, voltage or power, through the control by the input power of a larger amount of power supplied by a local source to the output circuit.

Anode: An electrode to which an electron stream flows.

Attenuation: The reduction in power of a wave or a current with increasing distance from the source of transmission.

Audio Frequency: A frequency corresponding to a normally audible sound wave. The upper limit ordinarily lies between 10,000 and 20,000 cycles.

Automatic Volume Control: A self-acting device which maintains the output constant within relatively narrow limits while the input voltage varies over a wide range.

By-Pass Capacitor: One used to provide an alternating-current path of comparatively low impedance around some circuit element.

Cathode: The electrode from which the electron stream flows. (See Filament).

Amplification Terminology

Class A Amplifier: One in which the grid bias and alternating grid voltages are such that plate current in a specific tube flows at all times.

Class AB Amplifier: One in which the grid bias and alternating grid voltages are such that plate current in a specific tube flows for appreciably more than half, but less than the entire, electrical cycle.

Class B Amplifier: One in which grid bias is approximately equal to the cut-off value so that plate current is approximately zero when no exciting grid voltage is applied, and so that plate current in a specific tube flows for approximately one-half of each cycle when an alternating grid voltage is applied.

Class C Amplifier: One in which the grid bias is appreciably greater than the cut-off value, so that the plate current in each tube is zero when no alternating grid voltage is applied, and so that plate current flows in a specific tube for appreciably less than one-half of each cycle when an alternating grid voltage is applied.

Note: To denote that grid current

(*Continued on page* 29)

IN THE SPOTLIGHT



By *HARRY SHERMAN*

WE HAVE received requests from many I. A. Local Unions for copies of the questions asked in the examinations for motion picture projectionists' licenses. We think that an interchange of these questions between the various Locals would benefit all concerned, and we shall be very happy to act as intermediary and pass them along to those Locals requesting them.

● Charles Hathaway, I. A. Representative for Oklahoma territory and business manager for Local 513, Tulsa, Okla., was a delegate to the Labor Conference on Labor Legislation held recently in Washington, D. C. Charlie served on the committee for Safety and Health, and for Workmen's Compensation.

● That progressive group of projectionists of Local 173, Toronto, Canada, have re-organized their Projection Society so as to put it on a better footing. The new organization is called the International Projection Society, and when present plans are completed will be housed in its own clubhouse where members will be provided with educational and recreational facilities. Okay, boys, reserve a ticket for yours truly on the opening night of the new club rooms.

Officers of the re-organized society are J. H. Hills, president; Sam Bowes, secretary; George Robinson, Roy O'Connor, Solly Cohen, and Sam Bowes, members of the executive board.

● Lester B. Isaac, supervisor of projection and sound for Loew Theatres throughout the country, joined the ranks of doting daddies with the arrival several weeks ago of his first son, Lester H. It follows that Lester B. is in a very expansive mood these days.

● We are very much interested in the efforts of Eric Holmes, projectionist at the Denham Studios in England and one of I. P.'s subscribers, to raise the standards of motion picture projectionists in his country. Holmes attributes the poor projection generally found in England to the fact that English exhibitors are unwilling to pay their projectionists a decent living wage. The low rates of pay plus the long hours prevailing in most theatres there do not attract to the profession the men technically equipped for this type of work, thus the field has been overrun with cheap juvenile labor having little if any knowledge of what constitutes good projection.

Holmes suggests remedying this condition by changing the "kinema" regulations which he claims are antiquated, and by licensing all projectionists; also, licenses should be issued only to those men who pass the examination, very much as is done in many cities in this country and in Canada.

Hundreds of thousands, very often millions, of dollars are spent in the production of a single picture. "The producer," says Holmes, "spares no expense in selecting his cast, director, etc., and he will pay a stupendous price for the story and build the most costly sets. In the final analysis, however, the proper showing of the picture lies in the hands of the projectionist, the man upon whose technical skill and knowledge depends the proper presentation to the public of an effort representing an investment of millions of dollars. The projectionist is the forgotten man in the film industry in England."

This is a condition, we believe, that NATKE (British organization simliar to our own I. A.) can do much to correct.

● It may be I. A. President Richard Walsh to the world at large but it's really Chief Nun-a-Koum Khay, or "Moving Creations," according to Chief of Chiefs Andy Paull, head of all North American Indians. Investiture ceremonies were held at a recent party tendered I. A. officials by Locals 348 and 118 of Vancouver, Canada, incident to the recent I. A. Executive Board meeting in Seattle Wash. President Walsh has an Indian totem pole as a memento of the occasion. President R. G. Pollock of Local 348, Vancouver, presided at the ceremonies.

Also enjoying the Vancouver boys' hospitality were I. A. Vice-Presidents Covert, Brennan, Kennedy, Snow, and Barrett, in addition to General Secretary-Treasurer Raoul, District No. 1 Representative Jacobson, and F. B. Murdoch, general

I. A. PRESIDENT WALSH MADE AN HONORARY CHIEFTAIN AT VANCOUVER PARTY

Chief Nun-a-Koum Khay, or "Moving Creation," is the title conferred upon President Walsh by Chief of Chiefs Andy Paull, head of all North American Indians. Taking part in the ceremonies were (left to right): I. A. Vice-Presidents Roger Kennedy, Felix Snow, Jimmy Brennan; Secretary, District No. 1, O. M. Jacobson; Chief of Chiefs Andy Paull; Chief Mathias Joe Walsh, Buffalo, son of Chief Mathias; I. A. Vice-President Wm. P. Covert, and William P. Raoul, General Secretary-Treasurer.



counsel for the I. A. Visiting Local Union men at the affair included J. McNabb and F. W. Jiencke, Local 154, Seattle; Brothers Martin and Foxgord, Local 168, Victoria, B. C.; C. Lafleur, Local 15, Seattle; F. J. Murtough, Local 81, Tacoma; A. K. Erickson, Local 727, Hollywood; and Brothers Backus and McArthur, Local B-71, Vancouver.

Prior to the banquet the I. A. delegation was taken on a sight-seeing tour of Vancouver, lyrically described by Secretary George Thrift as follows:

Vancouver Poet Laureate

"Sunday, January 26, was a warm Spring day with the sun sparkling on beautiful Vancouver harbor and coastal waters against a background of snow-covered mountains. Golfers dotted Capilano Golf Course, the finest on the Pacific Coast. Our visitors crossed narrow footbridges swaying and heaving hundreds of feet in the air over Capilano Canyon; they saw pools thick with salmon and marveled at the towering Douglas fir trees. Within twenty minutes after throwing snowballs at one another they were back to the warmth of Vancouver at sea level."

Ah, George, your continuing presence in Vancouver must be sheer heartbreak for Florida and California boosters.

● Karl Brenkert (Brenkert Projectors) announced the marriage last month of his only daughter, Virginia, to Paul Tierel, Naval ensign now stationed in Washington, D. C.

25 Years Ago—February 1922

● A. F. of L. President Samuel Gompers conferred with officials of the International Alliance, American Federation of Musicians, and Actors' Equity on the future progress of organized labor in the amusement field. . . . A bill prohibiting Sunday movies was introduced in the New York State Legislature. . . . Needless to say, it didn't get very far. . . . The National Vaudeville Artists' Club was the target of much criticism along the Times Square sector. Many members were displeased with the atmosphere at the clubhouse and there were rumors of sponsoring a new one. . . . Feud between the American and Columbia burlesque wheels resulted in the American circuit cutting down its playing time from 30 to 12 weeks. . . . The Minnesota Supreme Court handed down a decision against theatre picketing in answer to an appeal taken by I. A. Local 219. . . . U. S. Attorney General Daugherty declared war on organized labor, announcing that he would support the "open shop." . . . I. A. Representative John J. Barry recovering from a serious illness. . . . The U. S. Railroad Labor Board re-established the ten-hour day at the usual hourly wage. . . . A new circuit was formed by the Shuberts and I. H. Herk, president of the American Burlesque Association. . . . U. S. Department of Labor reports a decrease in unemployment throughout the country for the month of January. . . . The dollar, according to the U. S. Department of Labor, was worth but 53.7 in New York City. Despite this fact, a movement was afoot to "deflate" labor. . . . Warnings were issued against Wm. Jacobs, who falsely represented himself to be a member of Local 228, Toledo, Ohio, and E. C. Beal, expelled member of Local 187, South Bend, Ind. Both these "gentlemen" specialized in playing upon the heartstrings of their listeners by relating tales of imaginary misfortunes. . . . Middle West reports good show business. . . . Chicago Opera Company in financial difficulties. An appeal was issued for additional financial support. . . . Many I. A. members were dropped from the membership rolls of affiliated Local Unions for failing to pay their I. A. fines. Among them was Bill Hurley, member of New York City Local 306, who later became the chief investigator for the Post Office Department. . . . Rand's Opera House in Troy, N. Y., completely destroyed by fire. . . . D. W. Griffiths reported to be contemplating producing "White Slave" in Westchester County, N. Y. Local Unions there pleased with the idea, but naturally . . . United Mine Workers, through their president, John L. Lewis, invited the Railroad Workers to join forces with them in resisting a downward revision of wage and working conditions. . . . The German Government issued an ultimatum to the leaders of the railroad workers strike in Germany to call off the strike or be subjected to a $50.000 fine plus a jail penalty. . . . Joseph L. Winkler, president of the Chicago Musicians' Local Union, was stabbed in the face during a meeting of the Executive Board.

I. A. Elections

LOCAL 163, LOUISVILLE, KY.

Chester Demaree, *pres.;* Clarence Young, *vice-pres.;* Robert Hulett, *rec.-sec.;* Edward Williams, *fin.-sec.;* John Flaherty, *bus. rep.*

LOCAL 182, BOSTON, MASS.

Joseph Nuzzolo, *pres.;* James O'Brien, *vice-pres.;* Joseph Caplan, *treas.;* Harold A. Kaitz, *rec.-sec.;* Albert R. Moulton, *fin.-sec.;* Walter F. Diehl, *bus. rep.;* Albert R. Moulton, *trustee;* Leon Narbut, Henry Gleken, Morris A. Goldman, *exec. board.*

LOCAL 143, ST. LOUIS, MO.

An off-year election: Charles Johnson, Howard Flier, Donald Blust, *exec. board for two years;* Charles Miehe, *re-elected trustee for three years.*

LOCAL 236, BIRMINGHAM, ALA.

J. C. Harper, Sr., *pres.;* Carl Jones, *vice-pres.;* J. Frank Mankin, *sec.;* Ralph A. Root, Sr., *bus. rep.;* C. M. Trent, *treas.;* W. F. Harper, *sgt.-at-arms;* J. T. Amberson, *chairman, board of trustees.*

LOCAL 376, SYRACUSE, N. Y.

Louis R. Boyd, *pres.;* Melvin A. Denny, *vice-pres.;* George A. Raaflaub, *rec.-sec.;* Lionel B. Wilcox, *fin.-sec.;* Harry C. Burley, *bus. rep.;* Francis Miller, *sgt.-at-arms;* William H. Maxon, *del. Central Labor Union;* Lawrence F. Sherman, Philip Rossomondo, John Eccles, *trustees;* Walter Scarfe, Elmo Carpenter, *exec. board.*

LOCAL 407, SAN ANTONIO, TEX.

Benno J. Kusenberger, *pres.;* Joe P. Cuevas, *vice-pres.;* Manuel Perales, *sec.-treas.;* Genaro Garcia, *rec.-sec.;* John D. Dennis, *bus. rep.*

LOCAL 650, WESTCHESTER CO., N. Y.

Upon the resignations from office of Arthur Martens and Richard Hayes, former president and business representative, respectively, of Local 650, a special election was held early this month and the following were elected to fill the vacant offices: Emil Smith, *pres.;* Joseph Schappach, *bus. rep.*

LOCAL 735, MT. CLEMONS, MICH.

Roy Suckling, *pres.;* Fred Devantier, *vice-pres.;* Jim Kimmick, *sec.;* George Konath, *treas.;* Bert Penzien, *bus. rep.*

● Walter A. Knopf, member of Local 253, Rochester, N. Y., has become a member of the Fourth Estate. He now conducts a regular chatty column in the Rochester Labor News, and a darned interesting one, too.

● O. Pearlo, chairman of the "seniority" committee of Local 182, Boston, Mass., now formulating a new seniority plan, would like to hear from other Local Unions on their ideas or plans on seniority rules as applied in their Locals. Address Brother Pearlo in care of the union offices, 260 Tremont Street, Boston 16, Mass.

● Belated congratulations to Clyde Cooley, secretary of Local 343, Omaha, Nebr., and son, Raymond, on the latter's recent marriage. Cooley, Sr., who, incidentally, is a member of the nationally-known 25-30 Club, was paid a surprise visit by his son at the I. A. Convention last summer after the lad's discharge from service, and proudly introduced him to all the other delegates.

● Anonymous letters—the refuge of the cowardly. We think it high time some official action was taken to stamp out this vicious practice in our organization. Perhaps a resolution introduced at the next I. A. Convention banning this type of political propaganda and making it a violation of the I. A. Constitution for any member or members to distribute or mail anonymous literature attacking other members of his Local Union, will do much to stamp out this evil.

We believe strongly in the freedom of

(*Continued on page* 26)

Insuring Successful 16-mm Showings

Neglect of the ordinary things, so commonplace as to be almost automatic, can mar a 16-mm showing. Herewith a group of tips on such showings as compiled in booklet form by the Aetna Life Insurance Co.

GO to the hotel or club yourself and make a personal inspection of the available rooms. Make sure, first, that the room is large enough to handle comfortably, without crowding, the maximum number expected to attend. As you view the room, visualize in your mind (a) where the audience can best be seated. (b) where the screen should be placed, and (c) where the projector should be located.

In this connection, the screen should be placed so that no light can shine directly on it. For example, in a room where a window, in one end of the room, can be "blacked out" only partially—put the screen directly in front of this window rather than on either side. Light from the back will not show through but light on the face will be reflected.

In planning the seating arrangement, bear in mind that the first row of seats should *never* be closer than 10 or 15 feet to the screen. If the showing is to be held in the daytime, can the room be easily darkened? Assuming that in order to darken the room, all windows will be closed and covered. how will this effect the ventilation? If possible, try and obtain a room that is air-conditioned.

Check Space and Current

Does the room face on a noisy street? Obviously, this should be avoided if possible. Also, avoid rooms with direct sunlight. The darker and quieter the room, the more effective the presentation. Does the room have the proper electrical outlets conveniently located? Most machines operate on A.C. current only. It may ruin a machine which operates on A.C. current only to plug it in on a D.C. line. Therefore, the type of current should be very carefully checked. If the electrical outlets are not conveniently located, it will be necessary to provide extension cords. These should always be obtained in advance.

Some cities have ordinances restricting the use of projectors at gatherings unless the location has been inspected. Check on this and, if necessary, obtain a projection permit from the local police or fire department.

Make sure that your projector is in good running condition and that it has been inspected since the last showing. Obtain a standard screen in good condition. (A sheet or tablecloth is definitely not "standard"!) For an average audience, a screen 4 by 6 feet is satisfactory. For larger groups, a screen 8 by 11 feet should be used.

Arrange to be at the room where the showing is to be made before the scheduled time of the showing. If the meeting is a luncheon meeting, set up the projector before the luncheon starts. *Never set up during a meeting.* Make all tests before the meeting starts.

Projector, Speaker Placement

The projector should be placed at the rear of the audience and far enough back so that the picture covers the full screen.

It should be placed on a stand high enough to clear the heads of the audience. The screen itself should be placed high enough for people in the back rows to see, but not too high for those in the front rows. The sound speaker should be placed as near as possible to the screen (*but not in back of it*) and above the seat level (*not on the floor!*). If you are using a fairly large room, *two* speakers, one on either side of the screen, should be used.

All wires, particularly those leading from the projector to the sound speaker and to the electrical outlet, should be covered, or protected, to prevent members of the audience from tripping over them or accidentally disconnecting them. Run through as much of the film as time will permit before the meeting starts. In addition to giving you a check on your equipment, it will give you a chance to determine how well the room can be darkened and where additional curtains or drapes are required.

Focus your machine to give the sharpest possible image. Adjust the sound level for both tone and volume. If there should be low volume, a lot of crackle, hissing or other unusual noises, refer to the instruction book furnished with each projector for assistance in finding the trouble. If the picture and sound are not synchronized, correct the loop made in threading the film to the soundhead. When the best possible sound has been obtained, be sure there is ample volume in reserve, because a room filled with people will absorb more sound than an empty room.

Post-Show Procedure

After the test run has been completed, clean the aperture gate on the projector, rethread the machine, focus and stop the projector on the fade-in of the opening title. Make sure you have spare bulbs and tubes. If a bulb or tube fails, be

(*Continued on following page*)

DISTANCES BETWEEN PROJECTOR AND SCREEN IN FEET

SIZE OF LENS	20′	30′	40′	50′	60′	75′	100′
1½″	5′–0″ 3′–9″	7′–6″ 5′–7″	10′–0″ 7′–5″	12′–6″ 9′–4″	15′–6″ 11′–7″	18′–8″ 13′–9″	25′–0″ 18′–8″
2″	3′–10″ 2′–10″	5′–8″ 4′–3″	7′–6″ 5′–7″	9′–4″ 6′–11″	11′–7″ 8′–11″	14′–2″ 10′–6″	18′–9″ 14′–0″
2½″	3′–0″ 2′–2″	4′–6″ 3′–4″	6′–0″ 4′–6″	7′–6″ 5′–6″	9′–6″ 7′–0″	11′–4″ 8′–6″	15′–2″ 11′–4″
3″	2′–6″ 1′–10″	3′–8″ 2′–9″	5′–0″ 3′–9″	6′–4″ 4′–8″	8′–0″ 6′–0″	9′–6″ 7′–0″	12′–8″ 9′–5″
4″	1′–10″ 1′–4″	2′–10″ 2′–1″	3′–10″ 2′–10″	4′–8″ 3′–6″	5′–10″ 4′–4″	7′–2″ 5′–4″	9′–6″ 7′–0″

HOW TO GET BEST 16-MM PROJECTION RESULTS

Let's ossume thot we hove (1) o room 40 feet wide by 60 long, (2) o stondord size screen, 6 feet wide by 4′ 4″ high and (3) o projector equipped with the stondard 2-inch focol length lens.

By referring to the chort obove, we note thot with o 2-inch lens we con ploce the projector 30 feet from the screen ond obtoin on image 5′ 8″ wide by 4′ 3″ high. This would be perfectly sotisfactory so for os the size of image is concerned, but it would ploce the projector in the middle of the audience—an undesiroble spot. We *prefer* to hove the projector in the reor of the room—opproximotely 60 feet from the screen.

So ogain referring to the chort, we note thot ot o distance of 60 feet we con obtain an imoge 5′ 10″ wide by 4′ 4″ high (just obout the size we wont) provided o 4-inch lens is used. But where to get o 4-inch lens? A lens in ony standord size con be obtoined from most ony photogrophic store on o rental basis.

Bell Labs' New Traveling-Wave Tube

Amplifies Over a Band 40 Times Wider Than Present Tube

IT looks like an oversize thermometer. But this entirely new and yet surprisingly simple vacuum tube amplifier, known as the traveling-wave tube and developed by Bell Telephone Laboratories, may be of far-reaching significance in television and long-distance telephone transmission. It may even make it practicable to send television all the way across the country.

Preliminary tests indicate the tube may amplify dozens of full color or black-and-white television programs simultaneously. Or it could theoretically handle more than 10,000 simultaneous cross-country telephone conversations, or over 100 million words a minute by telegraph!

Over the past three decades in which amplifier engineers have had the vacuum tube to work with, considerable progress has been made in developing tubes and associated circuits capable of amplifying wider and wider bands of frequencies. For example, a band width of about 10,000 cycles at the beginning of the period has been broadened to one of about 20,000,000 cycles (20 megacycles) today.

Breaking sharply with the past, this magic traveling-wave tube promises to amplify voice or television signals over a frequency band 40 times as wide as that of the best tube now in use and to give many times the amplification.

Enormous Amplifying Power

Conservative figures for the new tube show a power gain of 10,000 over a band width of 800 megacycles! By comparison, the present pentode tube can give a power gain of only 10 over a band width of 20 megacycles; while a velocity modulation tube, operating in the microwave range, gives the same amplification over a band width of 10 megacycles. Engineers believe that even these figures for the new tube can be improved, for it has by no means reached its full development.

In addition to these contributions to wideband amplification, the tube is remarkably simple. It is only about 18 inches long and only a few inches across. An entire amplifier hook-up, of which the tube is the heart, occupies a space less than two feet long and a few inches square, and it can do the work of a maze of tubes and circuits.

The idea underlying the tube was proposed and was worked on during the war by a British scientist, R. Kompfner of Oxford University's Clarendon Laboratories. Dr. John R. Pierce, of Bell Telephone Laboratories, with Dr. L. M. Field, has solved the electronic problems of the new tube and overcome effects which rendered earlier efforts of little practical value. Together with F. H. Best, also of Bell Laboratories, they have produced a practical, workable device.

Electrons 'Blow Past' Wave

The principle of the tube's operation is entirely different from previous type amplifiers. It does not even look much like an ordinary tube for it has a narrow, glass stem about a foot long, and then on one end it flares into a bulb.

Inside the stem is the essence of the tube, a long coil of thin wire, or helix, running from one end of the stem to the other. The wave to be amplified is fed onto the coil at the bulb end through a wave guide and then drawn off at the other end in the same way.



Bell Lab's entirely new yet surprisingly simple vacuum tube (traveling-wave) amplifier. Holding the tube is Dr. J. R. Pierce, who developed it.

The wave travels along the coiled wire at the speed of light, but because of the winding of the wire, it moves along the length of the tube at only 1/13 of this speed. Meanwhile, from the bulb—actually, an electron gun—a beam of electrons is shot through the inside of the coil down the stem in the same direction the wave is moving and at approximately the same speed, *i.e.*, 1/13 the speed of light.

Wind, Water Analogy

The speeds are not exactly matched, however, and on the average the electrons go faster than the wave. They tend to slow down, though, and in so doing, they give up some of their energy to the wave. As a result the wave gains a tremendous amount of energy and becomes many times amplified.

The picture is not unlike that of a breeze blowing past ripples on a pond: the ripples grow larger as the breeze blows them along. In the tube, the electrons "blow past" the wave on the coil and reinforce the wave by transferring energy to it.

SUCCESSFUL 16-MM SHOWINGS

(*Continued from preceding page*)

ready to insert a new one immediately.

Arrange with someone to be responsible for turning off and turning on the lights. The lights should be turned off the instant the picture starts (*not before*) and should be turned on again as the end title fades out. A few minutes before the film is to be shown, be sure to turn on the sound in order that the amplifier will be "warmed up" and ready to go when the time comes. Do not take down the equipment until the meeting is over. As soon as the film is completed, be ready to proceed immediately with the next item on the program. Avoid any undue delay.

RCA 16-mm Equipment Used on C. & O. DeLuxe Trains

The regular showing of 16-mm motion pictures on Chesapeake and Ohio Railroad trains features RCA projection and speaker equipment. Overcoming space limitation problems encountered on two dining cars initially doubling as "theatres-on-wheels," C. & O. set up a tiny projection booth 45 inches wide and 72 inches long. Dual projectors, standing side by side, permit uninterrupted showing of feature-length films with maximum convenience for the projectionist. The projection booth is complete with automatic changeover, monitor speaker, rewinds, film cabinets, etc. Four-inch lenses are used in the projectors. The beaded screen is approximately 60 inches wide.

The speaker system includes the standard RCA 16-mm speaker in combination with a directional horn unit to insure complete distribution of sound throughout the length of the car. Dining car tables fold out of the way and disappear under drapes which are pulled across the windows. Seats are set up across the width of the car. Normal movement of trains is reported to have no disturbing effect on the projection equipment.

Standard Projectors Employed

Projectors are standard commercial models in all respects, including 750-watt lamps and 4-inch coated lenses. One right-handed and one left-handed projector are teamed to economize on space. Throw is 50 feet, with speakers positioned 4 feet above the car floor. Speakers, consisting of one standard and one special h-f unit to overcome the 60 db. noise level of extraneous noises when the car is in motion, are connected to amplifiers by a shielded cable carried through existing duct work.

Pre-heating of amplifiers and projection lamps is automatic with the changeover control. Ports in the soundproof projection booth are glazed with ¼-inch optical glass. Monitor speaker is mounted above ports. Projectionists are I.A.T.S.E. members under contract to the C. & O. R. R. for this specific type of work.

Technicolor Process Today

By JACKSON ROSE, A. S. C.

Author of "American Cinematographer Handbook and Reference Guide," of which the appended article forms one chapter.

THE first Technicolor laboratory was built within a railway car at Boston. In 1917, this car was transported to Jacksonville, Florida, for the production of the first Technicolor feature, "The Gulf Between." This feature had been preceded by one photographed in England by another process. This process photographed the color components by successive exposures, and it was nothing for a horse to have two tails, one red and one green. and color fringes were visible whenever there was rapid motion. Technocolor's idea was two simultaneous exposures from the same point of view—but it called for special attachments on the projector, which were found impractical.

Technicolor tried and abandoned spespecial attachments on the projector. It abandoned additive process and turned to imbibition. It developed the two-color process to the point where it was good—but Dr. Kalmus felt that it was not good enough. Yet this process was a necessary step to present-day Technicolor.

In May, 1932, Technicolor completed the building of its first three-component camera and had one unit of its Hollywood plant equipped to handle a moderate amount of three-color printing. This three-strip process, which is now standard, has since undergone continual development and improvement.

The present-day three-component Technicolor process, which makes use of special cameras, may be described briefly as follows:

Technicolor 3-Color Process

Light reflected from a photographed object enters a single lens and strikes a prism. Part of the light passes through the prism and through a green filter to a green sensitive primary negative. The remainder, reflected at right angles, is absorbed by two other primary negatives, individually sensitive to blue and red light. These negatives which have recorded the primary color aspects (red, green, and blue) of the scene are developed to produce negatives which look much like black-and-white negatives, but each one is a record of the primary colors in the scene.

Thus, in photographing a red barn in a green field with a blue sky, the red record negative would have the image of the barn, the green record negative the image of the field, and the blue record negative the image of the sky.

From each of these three-color separation negatives a special positive relief image is printed and developed. These positives differ from ordinary positives in that the picture gradations are represented by varying thicknesses of hardened gelatine. These positives, which are called "matrices," are used as printing plates. They absorb suitably colored dyes and are then used in a manner similar to color plates for a lithograph, the dye image from each of the three matrices being transferred one after the other upon the final completed print ready for projection.

In addition to this well established standard three-strip procedure, Technicolor is now using its Monopack process, which does away with the necessity for special cameras.

Technicolor Monopack Process

In present methods of motion picture photography where several copies of prints are required, the film which is exposed in the camera becomes the "original" record of the scene. In either black-and-white or color photography this "original" may be a negative or positive, depending upon the type of process.

Monopack is a single film which can be exposed in any standard black-and-white camera with color-corrected lenses, developed as a negative, but is reversed in processing to become a positive color print. It has three layers of light-sensitive emulsions, scarcely thicker than ordinary black-and-white film, but each emulsion layer sensitive to a primary color.

The surface emulsion is sensitive to blue; the second emulsion is sensitive to green, and the third emulsion is sensitive to red. After development as a negative, the three images are bleached out and again exposed and developed in coupler developers. The resultant images are positive and dyed with colors complementary to the emulsion layers. All three colored images being directly superimposed upon one another, perfect registration is assured. Critical sharpness of the three primary images and the lack of grain of this multi-layered film produce extremely sharp separation results.

For additional prints from Monopack, separation negatives must be made by an optical printer in which the Monopack is projected through a filter for each separate color after which the conventional Technicolor imbibition process is employed, as in the case of other type of originals, either three-strip negative or successive-exposure cartoon color photography.

Trade Unions in America

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

III

JULIUS CAESAR feared the power of crafts. He issued imperial edicts which put a number out of existence, or forced them to meet secretly and carry on their craft activities surreptitiously. But the loyalty of the crafts to their unions proved stronger than the Emperor's power, and for that matter the Senate's, who upon Cicero's urgent speeches, had enacted laws in substance similar to modern anti-labor legislation in this country.

Caesar and the Roman Senate for a short while curbed the strength of the unions and limited their activities, but for only a short time. The crafts had already existed for almost a thousand years. Their members had been taught to understand their rights as free men. They possessed inspiring records of accomplishment. They were well disciplined and thoroughly understood the power of collective action. They were also the backbone of the republican tradition in Rome.

Some of their problems came from the organization of newer unions which they had encouraged. The strength of their movement in the beginning consisted of the thoroughly skilled craftsmen in the metal working and the building trades. The newer unions were composed of workers who in their specialty were skilled, but not in comparison with the older crafts. We find that in Rome there were unions of pearl workers and filagree workers not members of the skilled jewelry workers' unions. There were also unions of perfume makers, ring makers and wreath makers.

Craft Union Development

Such unions depended for their existence upon the militant strength of the skilled crafts, but contributed little toward their strength. They were more parasitical, depending upon the other crafts for their existence, than cooperative and constructive.

There were some non-building trades

(*Continued on page* 30)

TEST EQUIPMENT FOR THEATRES

(*Continued from page* 14)

from reaching the volume control or the grid of the first tube; the input connection can, therefore, be attached directly to the amplifier plate circuit. An output jack, capacitively coupled to the plate of the output tube, facilitates the use of headphones if desired. Power is supplied by a built-in power supply operating from the 120-volt, 60-cycle A. C. line.

A jack on the front panel is connected, through a resistor-capacitor filter, to the integral power supply, and will supply anode voltage to one or two photocells. This voltage may be connected, by the simple throwing of a toggle switch, through a 1-megohm coupling resistor to the amplifier input jack. This connection permits the amplifier to operate directly from a photocell without any other electrical connections whatever.

Manifold Tests Possible

These features permit the use of this device for many tests, such as:

(1) Focusing optical systems, adjusting lateral guide rollers, or balancing push-pull photocells on one sound head while the other is in normal operation;

(2) Checking one sound head for proper operation, normal photocell output quality, film, exciter lamp, and photocell defects, hum or vibration pickup, *etc.*, while the other sound head is in normal operation;

(3) Stage-by-stage tracing to locate sources of noise, distortion, intermittent operation, or low gain;

(4) Testing auxiliary devices, such as microphones, phonograph pickups, *etc.*, for normal operation;

(5) An emergency substitute for the normal photocell anode supply, and the first stages of theatre sound systems, in which failure has occurred;

(6) Talk-back from stage to projection room when installing equipment (when used with a microphone);

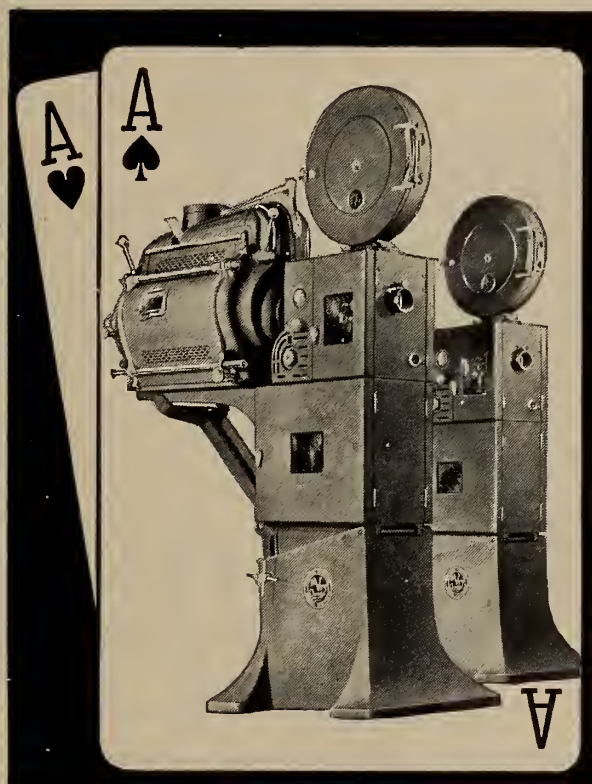
(7) In conjunction with a photocell, to find out whether room illumination supply is D.C. or A.C. (With a photocell and test lamp, to determine whether an unknown power source is D.C. or A.C.) If A.C., hum will be heard from the loudspeaker; if D.C., no hum will be heard, but clicks may be produced by interrupting the light which falls on the photoelectric cell.

The Triatic Signal Tracer also includes a circuit probe tester incorporating a resistor-capacitor circuit and the electron-ray tube 6U5/6G5. This circuit provides a means of rapidly checking an amplifier or similar circuit to determine the approximate voltages present, their polarity. and whether they are direct or alternating. Only one range is needed, which is not subject to burnout or damage on voltages ordinarily found in an audio-frequency amplifier. This range extends approximately from 2 to 500 volts.

D.C. voltages are indicated by the opening or closing of the electron-ray tube shadow, depending on polarity; the voltage is estimated by noting the time taken (after the probe has been removed from the circuit being tested) for the resistor-capacitor to discharge enough to allow the electron-ray tube shadow to return to its normal position. This is accurate enough for rapidly checking circuits in case of trouble, when it is merely necessary to determine whether or not the voltage present is somewhere near its normal magnitude.

The alternating-voltage indication is a blurring of the edges of the electron-ray tube shadow, the result of the rapid opening and closing produced by the applied alternating voltage. Since alternating voltage cannot charge up resistor-capacitor circuits to any permanent value, voltages are indicated by the width of the blurred area.

All necessary cables, plugs, and cords are furnished with this equipment. These are placed in space provided in the bottom of the cabinet. In addition, a bracket is provided on the back of the special VoltOhmyst for carrying its own plug leads.



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In DeVRY's *new* Theoter Projectors — *incorporating both picture mechanism and soundhead in one single unit*—you get the weolth of knowledge ond experience goined in the vost loboratory of wor production. You get design refinements, resulting in simplicity of mechonism ond eliminotion of unnecessory ports—to moke mointenonce economical and servicing eosy. You need to see them in oction to reolize the rock-steody, flicker-free screening of the new DeVRYS . . . the high fidelity of their true-to-life sound, from the softest whisper ond the wormest tone to the weirdest shriek or the roor of o mighty orgon. . . . *No perceptible flutter, hum or wow!* Top-flight performonce for either block-ond-white newsreel or Technicolor feoture. Priced to enoble ony theoter to offord NEW equipment.

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IN THE SPOTLIGHT

(*Continued from page 21*)

the press, and will defend the right of every man to his own opinion; but we despise the individual who takes "sneak punches" at an adversary by sending out scurrilous literature anonymously, or else hides behind some phony signature such as "Paid for by the friends of so and so," "From the committee for a cleaner administration," or some other equally inane slogan.

Many a man's reputation has been ruined without being accorded a chance to defend himself. Anonymous literature defaming the character of a man is almost invariably the resort of the unscrupulous and the lying, and should be completely disregarded by all.

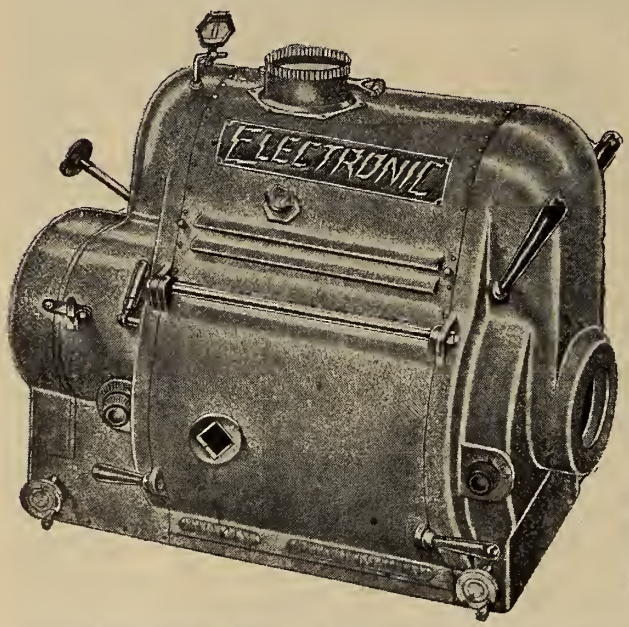
● In a radio address recently, Keen Johnson, U. S. Under-Secretary of Labor, emphasized that although many people disagree as to the causes of depressions it was generally agreed that "from 1796 until today no major depression has been due to the fact that the wage and salaried workers of America were given too large a share of the national income." This was Mr. Johnson's reply to fears expressed by certain individuals that we were headed for an economic slump because of the gains made by labor through genuine collective bargaining.

● We got quite a bang watching Cecil R. Wood, Sr., member of New York Local 306, induct his son, Cecil, Jr., into membership in the 25-30 Club. Wood, Sr., is a former city inspector and was the chief projectionist for D. W. Griffith's renowned spectacle, "The Birth of a Nation," shown for the first time more than 30 years ago. A grandson, Cecil III, is also a member of Local 306 and grandpop threatens to stick around long enough to obligate him into the 25-30 Club.

● Arnold A. Drew, secretary of Local 596, Springfield, Mass., reported that his Local membership voted a $465 donation to the building fund of the Franklin County Public Hospital of Springfield. Public spirit of this kind goes far towards creating a better relationship between labor and industry. Members of Local 596 are to be commended for their generosity.

A New **FOREST** *Development*

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A new and highly acclaimed development—ELECTRONIC CONTROL makes present mechanical systems of feeding the positive and negative carbons in projection arc lamps old-fashioned and obsolete; assures faultless arc control of precision accuracy, maintaining the proper focal point necessary for producing maximum light intensity without the necessity of constant watching and adjusting. Eliminates cams, gears, clutches and associated gadgets.

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STRONG'S *Zipper* CHANGEOVERS
AN ESSANNAY ELECTRIC MANUFACTURING PRODUCT

WESTERN ELECTRIC STOCK INCREASE

Stockholders of Western Electric Co. have approved an increase in the company's authorized capital stock from 6,000,000 to 7,500,000 shares. It is contemplated that the additional 1,500,000 shares will shortly be offered pro rata to stockholders.

The Bell System, currently engaged in the largest peacetime expansion program in its history, is placing heavy demands on W. E. for telephone equipment. Proceeds from the proposed sale of common stock will be used to finance the required expansion in W. E.'s manufacturing facilities currently under way.

Western Electric paid a divident of $1.50 per share on its common stock on December 31, to stock of record at the close of business on December 20, 1946. The company paid 50c in the third quarter and passed the dividend in the first two quarters when the company was operating at a loss. Thus, dividends for the year total $2.00 per share, the same as paid in the three preceding years.

'QUALITY' REPRODUCTION

(*Continued from page 6*)

at least only the lower partials, will be well represented. This is particularly interesting as it is exactly the result that is obtained from a good piano.

If we assume the correctness of this thesis, it should be possible to trace similar tendencies in the trend of development of other orchestral instruments, although as musical development is an art and not a science, it is to be expected that the time scale will be measured in hundreds rather than in tens of years. Nevertheless, the results can be just as positive as those obtained by any scientific process.

Tracing the development of any orchestral instrument is a rather difficult proposition, as instruments may, and do, become obsolete for reasons other than tone quality. Restricted range, difficulty of fingering or blowing, size or even mere fashion may end the popularity of an instrument.

The advantage (or otherwise) of reducing the upper end of the frequency scale can be checked by the reader in a very simple manner when listening to an actual orchestral performance, preferably when listening to the performance of a brass band in the open air.

The acoustic output of instruments like the trombone and trumpet is largely concentrated along the axis of the horn, the concentration becoming more marked at high frequencies. Thus the frequency characteristic is "flat" on the axis, while the high-frequency output falls relative to the 500-cycle components as the listener moves off the axis, *i.e.*, "top cut," can be put in without electrical equipment being involved. If this experiment be tried indoors, the listener should be fairly close to the instrument in order to minimize the effect of reflections.

The theme will not be pressed further, but instead an attempt to draw some conclusions will be made.

Public Preference Inquiry

It appears that in a high-quality reproducer system with total distortions 10-15 db. below the level at which separate tests indicate distortion as "just noticeable," public preference for a restricted frequency range exists. This optimum range is approximately 3 db. down at 70 cycles and 6,500 cycles, but is somewhat dependent on program material.

A similar preference appears to exist when electrical reproduction is not involved, except that an even more restricted range appears to be preferred, though absolute data on this point is not as complete as is desirable. It does appear that the presence of distortion is not the only reason for the general desire to "top cut."

In providing a tone control the engineer is making it possible for the great mass of the general public to express an opinion on a subject that has previously been the prerogative of musical circles. It is suggested that this opinion serves to confirm the general trend of the tone quality of orchestral instruments, though further investigation is required.

Insofar as the public tend to go further than musical instrument designers have gone in removing the upper partials, it would appear that some organized investigation of public preference is necessary as a guide to the designers of musical instruments and others interested in sound reproducing equipment.

Assuming the correctness of the present thesis it may be well asked: "What is the communication engineer going to do about it?" It is suggested that the present practice of transmitting with a flat or slightly rising characteristic and providing each listener with a tone control is the correct procedure. This gives a measure of pre-emphasis and de-emphasis, which, while not going as



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Unexpected repair and replacement bills give any manager a headache. With an RCA Sound Service and Parts Replacement Contract the cost of all parts and tubes for sound and projection equipment can be budgeted on a monthly basis.

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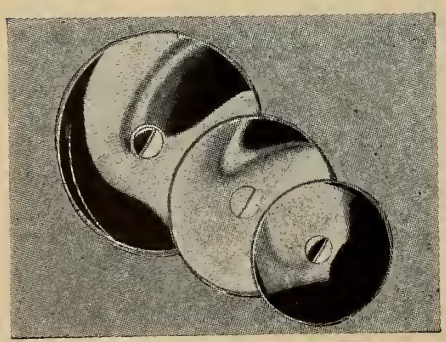
RCA SERVICE COMPANY, INC.
RADIO CORPORATION of AMERICA
CAMDEN, N. J.

far as American practice goes (wrongly, in the writer's opinion), does provide a highly useful and significant improvement in signal-to-noise ratio.

As to the technically-minded listener, it is suggested that he forget his preconceived ideas on where the tone controls should be set and adjust them to give the most *pleasing* reproduction. To salve the conscience, it would be a good idea to keep a log of the settings found most pleasing with different types of programs, and after about a year try and analyze the results with a view to ascertaining the preferred frequency characteristic.

In presenting this information on such a widely-debated subject, the writer has attempted to avoid inserting any personal bias either for or against the subject matter. The results present a disconcerting discontinuity in our previous line of thought, and it would appear imperative to obtain some further evidence of the mass reaction to frequency range restriction. The individual opinion of an engineer would appear to be less important than that of an ordinary member of the public lacking all knowledge of the prior art.





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'Weekend' Tops Film Daily Poll

"The Lost Weekend," a Paramount release starring Ray Milland, was rated the No. 1 motion picture of 1946 by 447 out of a total of 559 American reviewers for press and radio who participated in the 25th Annual *Film Daily* "Ten Best Pictures" poll. The remaining nine top films placed in the following order:

"The Green Years" (M-G-M); "Anna and the King of Siam" (20th-Fox); "The Bells of St. Mary's" (RKO-Radio); "Spellbound" (UA-Selznick); "Saratoga Trunk" (Warners); "Henry V" (made in England and released by UA in Americe); "Notorious" (RKO-Radio); "Leave Her to Heaven" (20th-Fox); and "Night and Day" (Warners).

Oddly enough and despite the steadily increasing use of color, only three of the winning pictures were color films, all done in Technicolor.

RCA 16-MM STUDIO ON WHEELS

The first complete mobile recording unit to be developed especially for 16-mm sound film recording has been designed and custom built by the RCA Film Recording Department. The unit consists of a complete film and disc recording channel installed in a custom-built body which is mounted on a 1½-ton truck chassis. The recording channel is of the Hollywood studio type and has all the features normally found necessary for the operations of major studios.

The optical system and film path of the standard RCA Model PR-23 Film Recorder installed in the mobile unit was specially modified to permit recording of direct positive as well as negative variable area sound track. The film recorder also includes a photographic slater and a synchronization marking system.

For "location" recording, the channel can be operated entirely by batteries which have sufficient capacity for approximately 20 hours of normal operation. Special windings on the motors of the camera and recorder permit interlock operation from either a 96-volt battery source or a 220-volt, three-phase supply.

SOUND SYSTEM DEFINITIONS

(*Continued from page* 19)

does not flow during any part of the input cycle, the suffix "1" may be added to the letter or letters of the class identification. The suffix "2" may be used to denote that grid current flows during some part of the cycle.

Control-Grid-Plate Transconductance: See definition of "Transconductance."

Conversion Transconductance: The ratio of the magnitude of a single beat-frequency component ($f_1 + f_2$) or ($f_1 - f_2$) of the output current to the magnitude of the input voltage of frequency f_1 under the conditions that all direct voltages and the magnitude of the second input alternating voltage f_2 must remain constant. As most precisely used, it refers to an infinitesimal magnitude of the voltage of frequency f_1.

Converter (generally, in superheterodyne receivers): A converter is a vacuum-tube which performs simultaneously the functions of oscillation and mixing (first detection) in a radio receiver.

Cross Modulation: A type of intermodulation due to modulation of the carrier of the desired signal in a radio apparatus by an undesired signal.

Current Amplification: The ratio of the alternating current produced in the output circuit of an amplifier to the alternating current supplied to the input circuit for specific circuit conditions.

Cathode Ray Data

Deflection Factor of a cathode-ray oscillograph tube is the reciprocal of the deflection sensitivity.

Deflection Sensitivity of a cathode-ray oscillograph tube is the quotient of the displacement of the electron beam at the place of impact by the change in the deflecting field. It may be expressed in millimeters or inches per volt applied between the deflecting electrodes, or in millimeters or inches per gauss of the deflecting magnetic field.

Detection is any process of operation on a modulated signal wave to obtain the signal imparted to it in the modulation process.

Detector: A device used for operation on a signal wave to obtain the signal imparted to it in the modulation process.

Diode: A type of thermionic tube containing two electrodes which passes current wholly or predominantly in one direction.

Direct Capacitance (C) (between two conductors): The ratio of the charge produced on one conductor by the voltage between it and the other conductor, divided by this voltage, all other conductors in the neighborhood being at the potential of the first conductor.

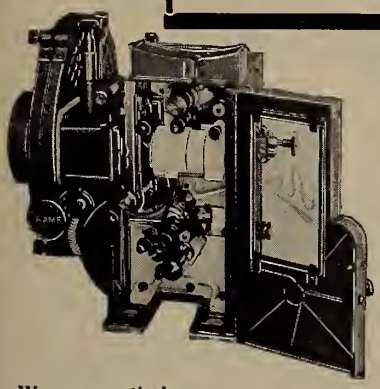
Dynamic Sensitivity of a Phototube: The alternating-current response of a phototube to a pulsating light flux at specified values of mean light flux, frequency of pulsation, degree of pulsation, and steady tube voltage.

(To be Continued)

WAA OFFERS 45 CINEFLEX CAMERAS

Forty-five *unused* 35-mm A-5 Cineflex silent motion picture cameras and kits which originally cost $1,950 each are being offered for $1,450 each by the War Assets Administration at 37 Broadway, N. Y. City. Cameras are motor-driven, complete with following items: 4 separate lens assemblies of 35-, 50-, and 75-mm size, all of F: 2.3 speed, and a 130-mm assembly with a speed of F: 4.5; 1 combination carrying case; 1 carrying case for six 200-feet magazines; 1 adaptor assembly, tripod mount; 1 rain cover; 6 holder filters; 1 driving motor, 24 volts, and 1 200-feet magazine.

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Now you can be assured of "smooth running" performance with this time-proven projector. Too, your present equipment will do a "smooth-running" job with Wenzel precision replacement parts.



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TRADE UNIONS IN AMERICA

(*Continued from page* 24)

and metal trades who became powerful and staunch defenders of craft rights. Among these were the carters (teamsters) who constituted the source for moving supplies to the cities and the armies stationed in the camps or in the field.

The Boatmen's Union of the Tiber, who handled all river traffic, was also a power in the industrial field. Its members organized similar unions in many of the Empire's cities. These branches were not in the same close affiliation with the parent body as modern local unions are with their internationals, but their principles and policies, their customs and practices were those of the parent organization.

In 206 A.D. there arose an active contest, when the Boatmen's Union set out to prevent fishermen and divers from boating on the Tiber.

In 264 A.D. the porters (longshoremen) succeeded in securing a decree from Valentinian and Valens which provided that "all goods imported by private individuals at the port of the Eternal City shall be unloaded by the porters under penalty of fine."

As Rome extended her territories through conquest and colonization, the crafts established themselves, this being true of England and France as well as Northern Africa and Asia Minor. Some records leave the impression that all craftsmen of Judea in Christ's time were thoroughly organized.

A tablet uncovered a few years ago in Chichester, England, indicates that in Nero's reign there was organized a union of carpenters and of stonemasons in what is now Glastonbury. Much building was done in England during the period of the Roman occupation. In the vicinity of Glastonbury many public and private buildings were constructed, including a temple to Neptune and Minerva.

The evidence so far uncovered indicates little federation between the crafts in the colonies, each local apparently depending upon its own strength for its protection. Yet it is difficult to believe that in communities containing a large number of craft unions, there should have been no bond between them. In the case of the building trades we have definite evidence that in some cities they jointly negotiated agreements with the building contractors and the authorities. At least in Rome the metal cafts seem to have had a metal trades council.

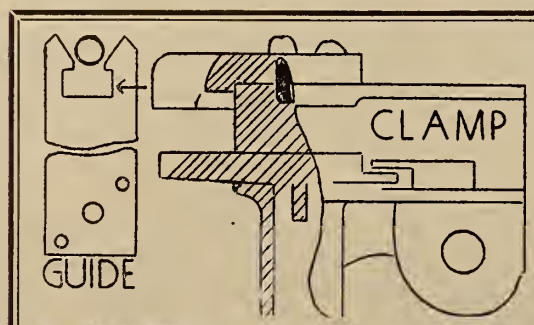
An Early Federation

From stone inscriptions listed by Orelli it appears that they had a federation consisting of sword makers, arrowsmiths, elliptical shield makers, round shield makers (the first type being made of wood covered with rawhide or bronze, the round shields being made throughout of bronze or copper). There were also included the dart and javelin makers, knife makers and spear makers.

Closely connected with this federation were the Ballastarii, the catapult makers, who fabricated the huge war machines used to break down walls during sieges. Within this union were the catapult erectors and adjusters who were sent to the place where these great war engines were to be erected, after the other members had produced the several parts.

No effort here is being made to give all of the authorities or quote extensively from the inscriptions uncovered. which today run into the many thousands. The only purpose is to make it evident that for well over a thousand years the craftsmen of Rome were solidly organized into craft unions, and that as Rome extended her territories the craft unions followed.

It would be historically valuable as well as interesting to have a record of the history of one of these unions from the time it was organized until the Roman Empire collapsed—a history which would



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contain an account of the problems it had faced and the policies adopted to deal with them. We would like to have a single financial report giving the items of income and expenses. We know that such accounts were kept and read to the membership at their meetings. As it is, we are without a knowledge of what the membership dues were, or the method of their collection.

There is proof that these craft unions developed officers who were highly skilled in collective bargaining with private employers or representatives of the government; that agreements were negotiated and entered into by the unions, much as is done today.

Labor Agreement of 459 A.D.

It was not possible until recently to find such an agreement preserved from the wreckage of time. For some six years before the First World War, Mr. W. H. Buckler, the eminent American archeologist, had been in charge of the excavations at Sardis, Asia Minor. During diggings in the city's forum, he uncovered a grey marble slab well preserved, containing a lengthy inscription. Translating it, Mr. Buckler found it to be an agreement between the building trades of Sardis and the Roman pro-consul dated 459 A.D.

Sardis had been experiencing a building boom covering private dwellings, temples and government building. The building contractors had difficulty in securing sufficient skilled craftsmen. Then, as now at times, they resorted to hiring their competitors' employes, of necessity offering inducements which may have led to eventual increases in the general wage rate.

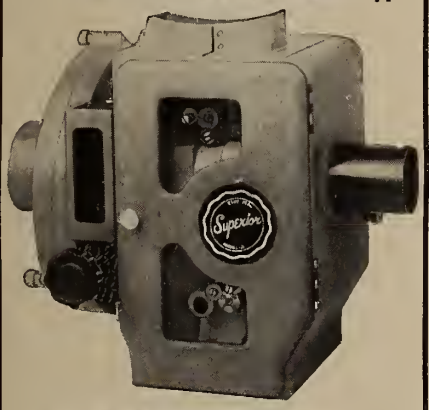
The situation became so serious that the pro-consul took firm action. At a conference with the building trades representatives he informed them that shifting of employment from one contractor to another during a building operation must cease. Once a craftsman had hired to a contractor he must remain with him until the building on which he was employed was completed.

As a result of the conference and the negotiations which followed an agreement was entered into with the pro-consul.

This agreement supplies a most impressive record of ancient industrial collective bargaining. The preamble is unique, but the first clause indicates the craftsmen's skill in protecting the membership, including a provision safeguarding their building trades wage scale. The building trades agreed to be bound by all the provisions of the agreement, "provided the employer is prompt in paying to us the wages mutually agreed upon."

[To be Continued]

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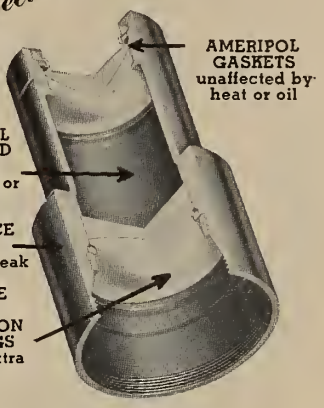
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Trouble-free performance is assured by the hermetically sealed construction of the Series II Snaplite. Its sleek black beauty typifies finer functional design—for the black anodized treatment, inside and out, is an integral part of the aluminum mount... it can't flake, chip, or peel off!

Enduring top performance is assured by the hermetically sealed mount, which excludes oil and moisture, and eliminates need for disassembly. Cleaning time is cut to a fraction—handling is minimized—danger of damage is sharply reduced. Light-weight aluminum mount cuts vibration to a minimum.

Brilliant pictures result from speed of f/2.0 in focal lengths from 3½" through 5". All optical surfaces are treated with durable anti-reflection coatings for still greater brilliance and contrast.



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Associated Electronic Engineers
A Society of
I.A.T.S.E. Theatre Sound Service Engineers

New Instant-Acting Safety Sprocket

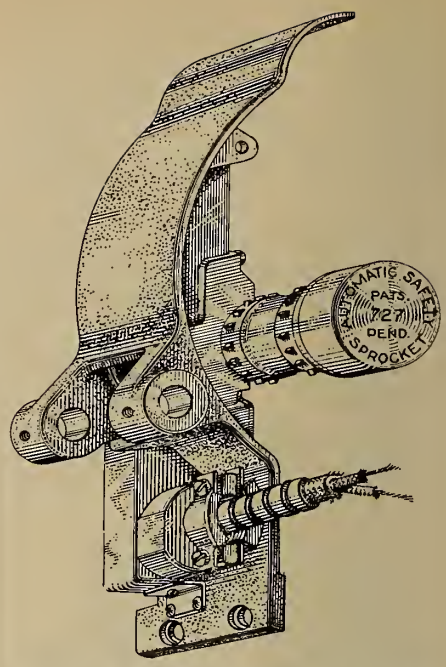
By LLOYD MANNON

Member, I.A. Local Union 162

TREMENDOUS amounts of research have gone into the quest to make safer the projection of nitrocellulose film, with some phases of the problem having been overcome through the years. When nitrate film is intelligently handled and stored under normal conditions the safety factor is quite high. However, conditions are not "normal" when nitrate film is run through a projector, thus providing all the elements necessary for instantaneous combustion.

Professional projection practice has ever recognized as the keystone of its safety program the need for unremitting vigilance by the projectionist should the mechanism falter for even a few seconds. A frozen projector bearing, a blown fuse, a faulty splice, or a torn film—any of these factors will precipitate a situation wherein even the quickest human reaction frequently does not suffice to avert disaster.

The only known safeguard against this unhappy condition is *automatic, instantaneous control* of the light and its intense heat which creates the danger. This entails the use of a control device that will act *before* the film can ignite. Basically, this means instantaneous cutoff of the light beam by means of positive dowser control.



How the Automatic Safety Sprocket achieves fireproof protection.

Various Controls Advanced

Such a control means is now available, but before detailing its construction and action it might be interesting to review several of the efforts made through the years to establish such a safeguard.

A device patented in 1911 utilized a governor which, driven by the film, actuated the fire shutter. In 1916 D. D. Daniel applied for a patent on an unit which, using trip arms, had as one of its principal objectives "improved means for making motion picture machines entirely safe from the dangers of fire."

A patent was issued in 1919 for a device which by means of switches and relays would purportedly extinguish the arc, ring a warning bell, stop the projector, and perform other little chores. The trip-arm devices was improved in 1927 to include a trip on the upper loop, a modified form of which means is used on certain projectors today.

Cite Electronic Applications

Electronics edged into the picture in 1932 when a patent issued covering the use of a beam of light to actuate a photocell which kicked a relay and operated a safety device. In 1934 a device was introduced which utilized sprocket hole frequency to operate a "safety" unit. Other units used "safety rollers" on belts, centrifugal switches were developed, and a score of even less plausible means were pressed into service.

None of these devices were successful because they failed to meet the basic

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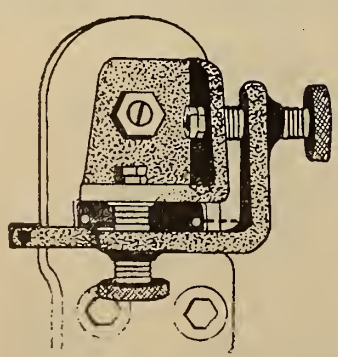
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requirement of instantaneous positive action.

Now available is the Automatic Safety Sprocket which meets all the aforementioned requirements with a large margin to spare. Sealed within the sprocket is an extremely accurate speed-sensitive mechanism which needs neither adjustment nor maintenance. It is simple to install because it comes on an adapter bracket made for each type of projector.

To install on a Super Simplex simply remove the three screws holding the back plate and replace with the Super adapter bracket (Fig. 1). Mounted thus the speed-sensitive mechanism within the Automatic Safety Sprocket operates a switch that is connected with the closing coil of the changeover dowser.

In threading the projector a normal lower loop is made which rides on the Safety Sprocket. During normal projector operation the Safety Sprocket is rotated at 360 r.p.m. by the film. Because of the Sprocket's location it is apparent that any danger of fire will immediately result in speedy positive action.

A blown fuse or frozen bearing will slow the Sprocket; loss of loop, torn sprocket holes or a film break will stop the Sprocket. Immediately any of these events occur the Sprocket will instantly cause the changeover dowser to close *before* a fire can start. Use of the standard changeover dowser obviates the need for a separate dowser.

Detailed information regarding the Automatic Safety Sprocket is available from Control Engineering Corp., 1069 Market St., San Francisco, Calif.

SMPE's 18 New Standards to ASA

Eighteen new equipment standards for the motion picture industry, designed not only for improvement of operations in this country but also to aid the expanding foreign markets, have been developed by seven subcommittees of the SMPE.

Longer life for release prints and quieter operation in theatre projection rooms are among improvements achieved by the new technical developments.

Included in the list, which have been forwarded to the American Standards Assoc. with recommendation that they be submitted to the International Organization for Standardization for acceptance as world standards, are the following:

For 16-mm silent film, camera and projector apertures; for 16-mm sound film, camera and projector apertures; 8-mm silent film, camera and projector apertures; projection reels for both 35- and 16-mm film; 8-mm projection reels; 16-mm sound and 16-mm silent film splices; negative and positive; 16-mm projector sprockets; 8-mm eight-tooth sprocket etc; 35-mm sixteen-tooth sprockets, and American recommended practice for motion picture engineering nomenclature.

The aforementioned new standards are in addition to 26 others already forwarded by the SMPE to the ASA during 1946. An interesting study of color motion picture printing is also under way.

SPEAKING OF SPEAKERS



Herewith the correct representation of Altec Lansing's intriguing "Iron Lung," which most effectively demonstrates visually the action of the diaphragm in "Voice of the Theatre" loudspeakers. This picture appeared upside-down in I. P. for January. This evidence of human fraility contrasts sharply with Altec Lansing speakers which unfailingly function perfectly irrespective of locale, positioning, climate or other adverse factors which bedevil less efficient units.

PUT MORE LIGHT ON YOUR SCREEN

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● All reflectors gradually deteriorate to a state where replacement cost is insignificant. A drop of only 10% in reflective efficiency results in a corresponding decrease in screen brilliancy, and represents a lass amaunting to 10% of the cost of your current and carbons. Replace yours now, and regularly. Available for all types and makes of arc lamps.

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SUPER SILENT SUPER SAFE

U. L. approved . . . eliminates fire hazard. Micro-Switch safety cut-off—when door opens, motor stops! Motor does not transmit torque to operating parts. Reel-drive Dog... prevents broken keys.

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Low Maintenance Cost • Positive Friction . . . Will Not Clinch Film

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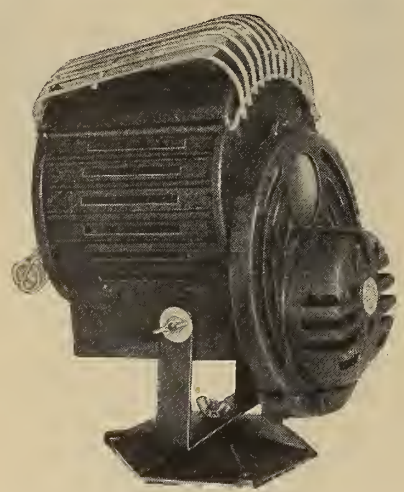
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THE STRONG ELECTRIC CORP.
87 City Park Ave., Toledo 2, Ohio
The World's Largest Manufacturer of Projection Arc Lamps

New GoldE Rotochrome 500-Watt Automatic Color Spot

Color in-motion is provided by the new Rotochrome spotlight just announced by GoldE Mfg. Co., Chicago. Smallest unit of its kind, this new spot yet combines 500-watt light, color and motion in one compact, safe and simple unit. Action is completely automatic, with smooth color changes assured. Internally mounted color wheel is fully enclosed, making for maximum safety of glass color panels and other working parts.

The Rotochrome is optically correct. Light beam size is readily adjustable from a powerful concentrated spot to a smooth flood in steps of continuous variation. Other features include a positive tilt adustment,



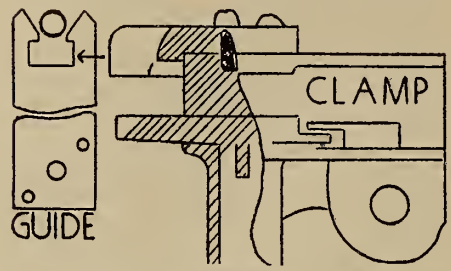
relamping from the top of unit, self-starting, and 6 smooth color changes per minute.

The Rotochrome can use long-life medium prefocused lamps of 500, 400, 300, 250 or 200 watts. Ceiling or wall mounting bracket is available. Net weight 10 lbs., operates on 60-cycle A.C., although other voltages and frequencies are available.

Detailed particulars available in Bulletin 471 upon request to GoldE at 1214 W. Madison St., Chicago,7.

Simple, Positive Carbon Saver

Designed to effect a 25% saving in carbon consumption is a new unit manufactured by Ben Matthews, member of Chicago Local 110. Utilizing an improved clamp and guide means, this Saver consists of an extension mounted permanently on the clamp, with a square hole in the guide permitting an extended block to go through. This makes it possible for a 14-inch carbon to last for 4 full 2000-foot reels, or a 12-inch carbon to last for 3 double reels and still have enough



Showing arrangement of 'Saver'.

carbon for an additional 1000 feet of film.

No tools or extra effort by the projectionist is required. This Saver is adaptable for Peerless, Ashcraft and Brenkert lamps. Orders accepted on a money-back basis with any supply dealer or write direct to Ben Matthews, 4111 No. Bernard St., Chicago. Orders must specify type of lamp and whether 7- or 8-mm carbon is used.

MONTHLY CHAT

(*Continued from page 3*)

end to the seemingly interminable experimental period of video during which only 'qualified staff personnel' may be used; also, that the fellows now undergoing 'on-the-job' training under the G.I. Bill of Rights (Uncle Sam pays the tab while the broadcasters pay peanuts) will some day graduate to the level of a full-pay worker".

We say now that if the video-to-film transition be as "intricate" as Par avers, then it certainly is not suitable for nation-wide theatre service. But even if it be a somewhat involved process (with which estimate we emphatically disagree) we would remind Par and the broadcasters that sound-film production —from the camera stage to the time a picture is projected on a theatre screen —is also a complex process involving tolerances finer than 1/10,000th inch. Still, our own I. A. mugs do so creditable a job through every step of the process as to win kudos for our American film technique.

We also would remind the anti-Union adherents that the I. A. today, right this minute, is far and away better prepared for tele work than it ever was for sound pictures back in 1926. I. A. men learned an expensive lesson with sound pictures, the fruits of which experience are evidenced by the millions of manhours I. A. men all over the country have spent, at their own expense, in readying themselves for tele. Paramount or any other outfit may select any city anywhere in the U. S. for the introduction of theatre video and there they will find availab[l] extremely competent I. A. men to do the job.

We think that this type of inconsequential nonsense emanating from one of the major film companies is more indicative of the fear of tele nurtured in the movie mogul's breasts than of any degree of concern for "Union competency". Any time theatre tele is ready so are I. A. projectionists and other affiliated crafts—and we include every step of the video process from camera to projection.

The payoff on the Ryder episode, of course, is the fact that the press conference which provided the springboard for the subsequent cracks by Paramount officials anent Union competency was not held under S.M.P.E. auspices. It was arranged by the Paramount home office publicity department.

* * *

Another engaging inanity during the past month was the publication in an exhibitor paper of the effusions of its "Advisory Council" on the topic of sound picture changeovers. Says the summary of Council opinion: ". . . the Council in general strongly prefers manual changeover between soundheads". Also:

"It all depends on the type of sound changeover device. If it is really positive in action, foolproof and troubleproof, it is a good thing. But if the device is not definitely proven for the individual type of sound system in question, we take on chances on creating sound troubles . . ."

This will definitely come under the heading of hot news to Larry Strong, of Essannay Electric Mfg. Co. of Chicago, and a Local 110 mug, who has been making the "Zipper" picture-sound changeover for years. In fact, we saw the first "Zipper" in 1929. It will also come as news to both RCA and Warner Brothers, each of whom rewarded Larry handsomely for his enterprise. It will also be news to Motiograph, Brenkert, Century and Devry, the theatre projectors of all of which are now factory-equipped with Strong "Zipper" changeovers.

Really, Larry, you should do a little missionary work among the members of this Advisory Council and remind them that this is 1947—not 1929 when you made your first "Zipper". Should Warners and RCA also get a refund?

The new Eveready 45-volt B battery displaces only 76.6 cubic inches as compared to the 179 cubic inches necessary to produce the same power and life in the old-style layer-built battery, and weighs only 4 pounds 4 ounces compared to 8 pounds 6 ounces. It has outside dimensions of 5⅛" x 2⅛" x 7¼".

CLAYTON BALL-BEARING EVEN TENSION TAKE-UPS

For all projectors and sound equipments

All take-ups wind film on 2, 4 and 5 inch hub reels.

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For perfect rewinding on 2000-foot reels.

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Guessing



can be expensive

Guessing can be expensive at any time but particularly so today with the present limitations on new projection room equipment and with the uncertainties of replacements. Every projectionist should know the whys and wherefores of his equipment. He should know what to do and what not to do when the equipment fails to function properly—and how to keep the show going until the service inspector arrives at the theatre.

PROJECTIONISTS' SERVICE MANUAL is a complete, compact compilation and a valuable reference work. All items therein are grouped according to classifications and contain sound practical suggestions relating to the many projection room troubles—their causes and how to remedy them.

A copy of this valuable trouble shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. local unions have ordered this book in bulk and placed a copy in each projection room. The price is right —only $3 per copy, postage prepaid. Order your copy now or ask your local union secretary about our special low-price bulk offer.

Send for it Now! *Do Not Delay*

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19 West 44 Street, New York 18, N. Y.

Gentlemen: Enclosed find $3.00 for which please send to me a copy of PROJECTIONISTS' SERVICE MANUAL, postage prepaid.

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REG. U.S. PAT. OFF.

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C. L. McVEY, OWNER — TED IRWIN, MANAGER

HERINGTON, KANSAS

October 17th, 1946

Mr. Arthur De Stefano
National Theatre Supply
223 W. 18th Street
Kansas City, Mo.

Dear Mr. Stefano:

Your records are correct in that I purchased the first pair of E-7 Simplex heads to be sold in this territory and I have been very happy thru the splendid service they have given.

Outside of replacing a sprocket or tension spring we have never had any repair expense on these heads in over eight years of constant use.

The most important point in theatre operation is a picture properly projected on the screen and the Simplex E-7 has met this qualification 100%. The dependable, economical operation has also convinced me that I made a splendid buy and further, when I replace machine heads in other theatres that it will be E-7. I can verify this thru our having just recently installed these heads in our Commonwealth Carrollton, Mo. theatre.

Kindest regards.

Sincerely,

C. L. McVey

C. L. McVey

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PROJECTIONIST

MAR 3 1 1947

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MARCH 1947

VOLUME 22 • NUMBER 3

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MONEY ISN'T EVERYTHING-

(OR IS IT?)

BY GROUCHO MARX



WHAT do you want to save up a lot of money for? You'll never need the stuff.

Why, just think of all the wonderful, wonderful things you can do *without* money. Things like—well, things like—

On second thought, you'd better keep on saving, chum. Otherwise you're licked.

For instance, how are you ever going to build that Little Dream House, without a trunk full of moolah? You think the carpenters are going to work free? Or the plumbers? Or the architects? Not those lads. They've been around. They're no dopes.

And how are you going to send that kid of yours to college, without the folding stuff? Maybe you



think he can work his way through by playing the flute. If so, you're crazy. (Only three students have ever worked their way through college by playing the flute. And they had to stop eating for four years.)

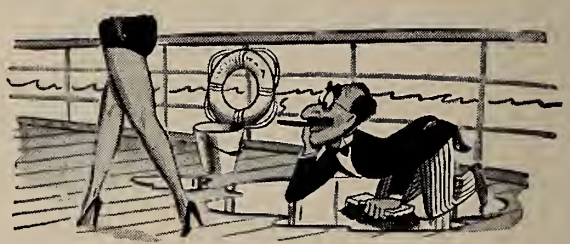
And how are you going to do that world-traveling you've always wanted to do? Maybe you think you can stoke your way across, or scrub decks. Well, that's no good. I've tried it. It interferes with shipboard romances.

So—all seriousness aside—you'd better keep on saving, pal.



Obviously the best way is by continuing to buy U. S. Savings Bonds—through the Payroll Plan.

They're safe and sound. Old Uncle Sam *personally*



guarantees your investment. And he never fobbed off a bum I.O.U. on *anybody*.

You get four bucks back for every three you put in. And that ain't hay, alfalfa, or any other field-grown product.



Millions of Americans—smart cookies all—have found the Payroll Plan the easiest and best way to save.

So stick with the Payroll Plan, son—and you can't lose.

SAVE THE EASY WAY... BUY YOUR BONDS THROUGH PAYROLL SAVINGS

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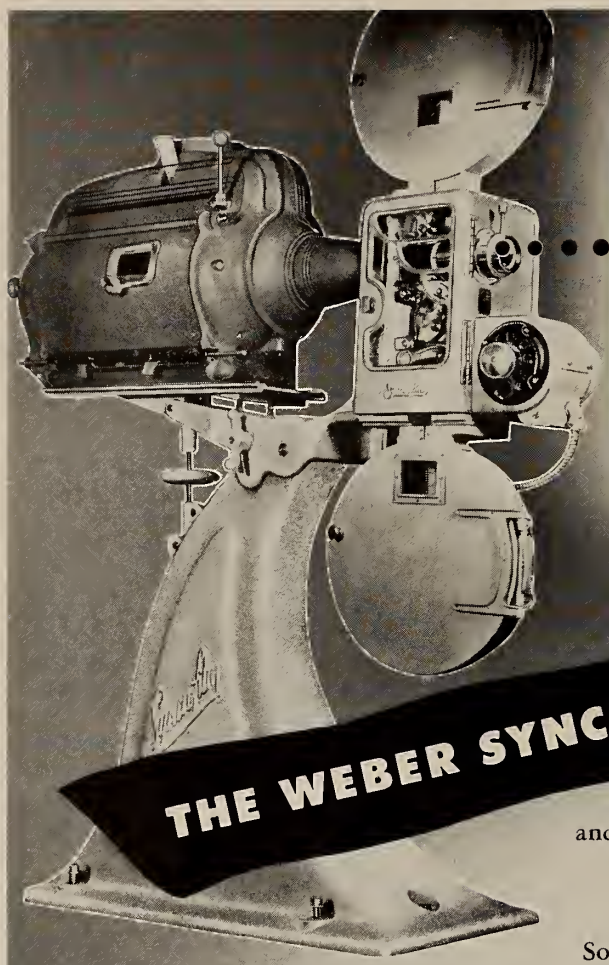
When you throw the lamphouse table switch..



and your screen is flooded with light, you are not apt to realize the long years of tireless research devoted to the development of equipment which made the attainment of this result so simple.

The direct current supplied to the arc must be stable and of the exact volt-amperage characteristics which have been predetermined as necessary to the efficient, carefree operation of the lamp. Shown is one of the full load tests being made on a Strong rectifier under actual operating conditions and which assure continued satisfactory operation of this Strong equipment, year in and year out.

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SOUND PROJECTION

From a Single Trouble-Free Unit

THE WEBER SYNCRO-DYNAMIC

FOR THE FIRST TIME—sound and projection engineered into one compact unit! Fifteen years of sound and projection "know how" is built into the Weber Syncro-Dynamic —the first single unit which, proven by test, meets the basic requirements of year-in, year-out, trouble-free performance and economy of operation. The Syncro-Dynamic Theatre Sound Projector is the modern way to theatre projection and sound efficiency. Low initial cost and minimum cost of operation is an important plus for economy-wise theatre operators.

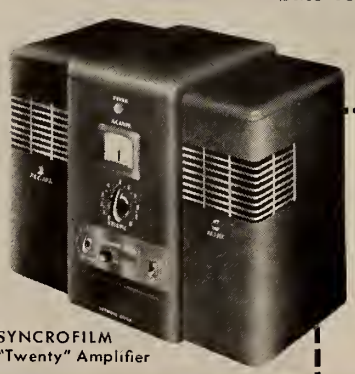
Synccofilm BETTER SOUND—LOWER COST

Treat your customers to better sound at lower cost to yourself. Round out your sound system with the Syncrofilm Model E Speaker, with wide high and low frequency range. The Model E Speaker is of permanent magnet design and reproduces voice, instrument and sound effects with absolute fidelity from deepest bass to highest overtone.



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HENRY B. SELLWOOD, *Editor*

Volume 22 MARCH 1947 *Number* 3

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MONTHLY CHAT

ANYBODY desiring to exhibit motion pictures for which an admission is charged in a public gathering place in the State of Iowa need consult nobody but may proceed to lease any old barn (literally) run-in a makeshift power line, install any type of outmoded and worn projection equipment, add as many seats as are desired in any pattern, and begin operations. Neither the close proximity of bales of hay to projection equipment utilizing nitrocellulose film nor the absence of even minimum lighting and exit adjuncts would prevent the opening of such a "theatre," much less induce a visit of inspection by any State or local authority.

Of course, if one's taste runs to innkeeping, one may use any hovel as a "hotel" on the same basis of official disinterest.

Now incubating in the Iowa Legislature is a bill, sponsored by the State Association of the I. A., which aims to correct a few of these more flagrant regulatory shortcomings. This bill has not the faintest "Union" tint in that it does not mention manpower or working conditions. It provides for those elementary safety precautions which for many years have been commonplace in almost all other states: the pre-opening inspection of building and equipment, adequate ventilation, sufficient exits, proper interior lighting, restriction on standees in the aisles and at the rear of the auditorium (just imagine!) no exposed wiring, workable projectors, safeguards anent the handling and storing of film, fire-resistive doors in the projection room—all those things which stem from a decent regard for the safety of the theatregoing public.

Word from Iowa is that the theatre bill, and a companion piece relating to hotels, are slated for defeat. After extensive public hearings and a bit of investigation? Like hell. Simply on the say-so of theatre owners ("It will put us out of business") and reflecting the attitude of a predominantly farmer Legislature with its senses dulled to the sound of any words but "pork" and "corn." The Legislature will expertly apply the ether to the bills by the simple expedient of ignoring them.

This from the lawmakers of a State which last December was the scene, in Dubuque, of a frightful hotel fire. Not to mention that Iowa has one of the worst theatre-fire records in the United States. One wonders if the exhibitor-farmer battlecry of "profits" will indemnify the victims of the next theatre fire: and did the same battlecry serve to restore life to the dead or salve the horrible burns of the injured in the Dubuque hotel fire?

Why talk about theatres and hotels which accommodate many hundreds, even thousands, of persons at one time? For years past every *restaurant*, irrespective of size, in "money-mad" New York City

(*Continued on page* 36)

The "C&C" SIX-PHASE RECTIFIER Is YEARS AHEAD

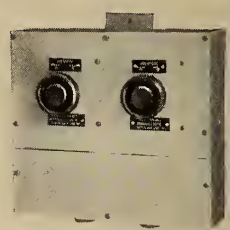


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VOLUME XXII MARCH 1947 NUMBER 3

Studio Super H. I. Carbon Arc Lamps

By PETER MOLE

Mole-Richardson Company, Hollywood

"If it isn't on the film it will not show on the screen." The finest projection equipment and most expert craftsmanship "can't show what ain't." Means for satisfying the ever-increasing demand for more and better quality light on both sets and screens is cited in this article, written expressly for I. P. by Hollywood's foremost set lighting technician.

"THAT outfit doesn't make pictures, it makes silhouettes," a projectionist remarked when viewing a picture done in low key throughout. "And the producer of that stuff comes to the projection room during a preview and wants to know why I can't give him more light." The foregoing is not a condemnation of low-key photography where the cinematographer is after an effect and where he remembers that the picture on the screen is light. If there be nothing on the screen but silhouettes throughout the picture, he has produced off-key instead of low-key lighting.

Fundamentally, the picture on the screen is the projection light source which is divided into light and shade by the selective absorptive properties of the motion picture film. Those selective absorption properties are density in black-and-white film, and density plus color in color film. The density and color on film is largely the result of the intensity and color of the lights used on the motion picture set.

In following the advances in motion picture photography it is interesting to note that the trend is toward an embellished natural-appearing result rather than toward a synthetic lighting effect. Many cinematographers are creating "one-source" lighting effects which, as the term implies, give the effect on the screen as though all of the illumination were coming from one source such as the sun. Of course, many lights are actually used, but the main source must be sufficiently powerful so all shadows are cast in the one direction.

This type of photography assures sufficient translucence in the highlight areas of the film so even when the "key" is very low there is enough light on the screen to hold the attention of the theatre patrons.

The M-R Type 450 Lamp

This trend created a demand for a studio set lighting unit with twice the light output of the Mole-Richardson type 170 lamp which operates at 150 amperes. In order to meet this demand the M-R Type 450 lamp (Fig. 1) which has been dubbed "The Brute" by the studios themselves, was designed.

Fortunately, this 100% increase in light output was obtained with only 50% increase in current. The Type 450 unit operates with a 16-mm X 22" super high-intensity positive carbon and a 17/32" X 9" cored Orotip negative carbon burning at 225 amperes and 75 arc volts; whereas the Type 170 lamp burns a 16-mm X 20" MP studio positive and a ½" X 8½" MP studio negative carbon at 150 amperes and 67 arc volts.

The newly designed Morinc condenser lens on the Type 450 lamp has a curved surface and is of 24" diameter which gives it a greater light pick-up angle than the 20" diameter flat surface condenser of the Type 170. The main advantage of the larger diameter curved surface condenser is that it provides for a greater arc-to-condenser distance at various beam divergencies, thereby minimizing the danger of condenser breakage from increased heat.

The Type 450 lamp head is not just a modification of the Type 170. The 100% light increase and 50% current



FIGURE 1. Mole-Richardson Type 450 lamp.

increase created problems of heat transfer and ventilation requiring a radical departure from the conventional rotating high-intensity lamp design.

The arc control motor, motor rheostat, arc switch and pin plugs were all removed from the heat of the body of the unit and located in a separate compartment on the rear lamp casting. Inasmuch as the balance of the carbon feeding mechanism is mounted on the front of this same casting, the whole forms an integral unit which may be easily removed for servicing.

By these changes in design it was possible to build a lamp head, capable of continuous operation at 225 amperes, with no increase in length, only 4 inches increase in diameter, and slight increase in weight over the Type 170.

The M-R Type 250 Process Projection Lamp

The super high-intensity carbon trim used in the M-R Type 450 lamp has been used in the M-R Type 250 process projection lamp for some time. It is the result of a cooperative effort, by a committee of the Research Council of the Academp of Motion Picture Arts & Sciences, which included the National Carbon Co. and the Mole-Richardson Co., toward the design of a carbon arc lamp which will meet the critical requirements and high light output demand of studio process projection.

Process projection is a system for inserting action backgrounds into sets built on studio stages. In this process a translucent motion picture screen forms the background of the set. In lighting the foreground care is taken that no stray light will reach the front of the screen. At a suitable distance behind the screen is the projection equipment which supplies the screen images to form the background for an otherwise inanimate set. This action may be, for example, scenery viewed through a train window, the traffic behind a car on a Paris street, an ocean background for creating the illusion of a ship at sea, *etc.*

The camera on one side of the screen is synchronized with the projector on the opposite side by means of interlocking synchronous motors.

Projection vs. Front Light

With the foreground area illuminated to the proper intensity for photography, the problems involved in obtaining sufficient projection light to fill a 20-foot wide, or larger, screen become serious. The Type 250 M-R process projection lamp was designed for this purpose, and because it delivers from three to four times the light intensity of the *average* theatre projection system, its features should be of interest to those desirous of learning the amounts of screen light available under highly specialized conditions.

A theatre type projection system consisting of a Suprex lamp operating at 70 amperes with a treated surface F:2 projection lens will deliver up to 14,000 lumens. The M-R Type 250 lamp operating at 225 amperes and 75 arc volts, with an F:2 relay condenser system and an F:2 treated surface objective lens will deliver as high as 30.000 lumens from one unit. Under certain conditions even higher readings have been made.

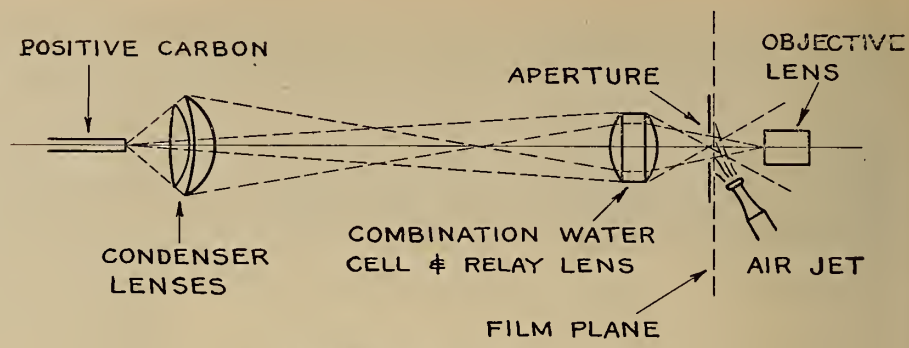
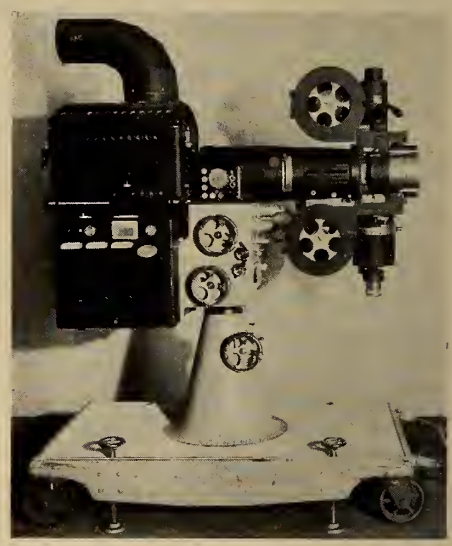


FIGURE 3. Relay condenser system.



Courtesy Farciot Edouart, Transparency Dept., Paramount Pictures, Inc.

FIGURE 4. A complete background process projection equipment.

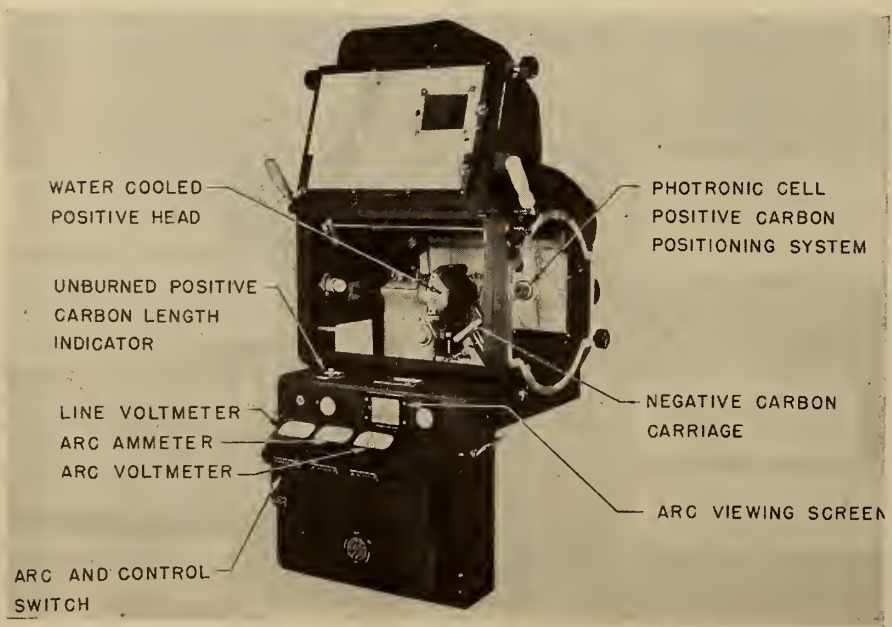


FIGURE 2. Mole-Richardson type 250 background process projection lamp.

When more light is needed on one screen than is available from a single relay system, the triple projector is used.[1] As the name implies, these units consist of three complete projectors, one facing the screen and the others at right angles projecting their images onto front surface mirrors which redirect them to the screen. In this manner three identical prints may be projected onto the same screen, thereby raising the level of illumination almost three-fold.

Severe Requisites Satisfied

To operate a lamp under such conditions of high current and requirements as to extreme accuracy of feeding and crater positioning, it was necessary to design a unit especially for process pro-

[1] I. P. for July, 1946, p. 37.

(*Continued on following page*)

Magnetic Recording Symposium by Academy

That magnetic recording, and possibly reproducing, means have generated intense interest among motion picture technicians is attested to by the many current contributions to the literature, including ample data which appeared in I. P. Appended hereto is an abstract of proceedings at two informal discussion sessions between manufacturers and studio technicians sponsored by the Academy of Motion Picture Arts & Sciences, Research Council. Inquiries on this topic are invited by the Council at 1217 Taft Building, Hollywood 28, Calif.

REFLECTING the ever-widening interest among motion picture technicians in magnetic recording and reproduction, the Basic Sound Committee of the Academy of Motion Picture Arts & Sciences recently held two general discussion sessions between designers and manufacturers of this recording process and studio personnel interested in its practical application to film production work.

The meetings considered first the replies to the following question which had been addressed to various manufacturers: "Are the manufacturers interested in developing a magnetic recorder for synchronized operation" Manufacturers' reactions follow:

Equipment Manufacturers' Views

(1) The Indiana Steel Co. believes that some types of paper or cellulose acetate could be adapted to a magnetic material coating. Either would make synchronized operation possible.

(2) The Magnecord Co. now has magnetic wire which at present is "non-sync." However, the company is interested in "sync" operation and believes that it may be possible to sync wire recordings automatically.

(3) Armour Research Foundation is not a manufacturing company, but concerns itself primarily with fundamental research and development. It offered to disseminate to Armour's licensees the information obtained at the Academy meetings. If these licensees are interested (and it is believed they are), the Foundation wil investigate the problem.

(4) Brush Development Co. is interested in both phases, that is, sync and non-sync. The company is now using both the wire and the tape.

Dr. S. J. Begun (of Brush) stated that before magnetic recorder manufacturers could proceed with the development of equipment suitable for studio use, it would first be necessary to know quality requirements of the studios. Do the studios want a recorder superior in quality to that of present film recorders, or one that is equivalent?

No Release Prints Now

In reply, the following studio requirements were given, in addition to those which have been incorporated into the list of suggested uses:

(1) *Release Sound Track.* — At the moment, at least, there has been no consideration given to the magnetic recording medium for release purposes.

(2) *Production Recording.*—For production recording of dialogue and music, a quality comparable to present film recording quality would be necessary.

(3) *Currently, the Following Frequency Ranges Are Used.*—For dialogue, from about 80 cycles to between 7000 and 8000 cycles; for music, from about 50 cycles to between 7000 and 8000 cycles. This means that the equipment must be of high quality from 50 to 10,000 cycles.

(4) *Volume Range.* — With film the range is about 48 db from maximum modulation to no signal with noise-reduction applied. Through the use of push-pull, reverse bias, pre- and post-equalization, *etc.*, it is possible to get a volume range up to 55 db. Through overload, for instance, in sound effects passages, a range of 60 to 65 db may be obtained. It should be noted that even this type of overload must not destroy the character of the sound. While going into overload is not desirable, it indicates a need for a greater volume range. Our present effective range in the theatre may at times be as low as 40 db.

(5) *Speed.*—The speed should be 90 ft. per min. for purposes of synchronizing and editing. Any other speed must have a very important advantage to be given consideration.

(6) *Distortion.*—Film distortions are in a range from 1 to 2% total harmonic distortion between 40 and 1000 cycles. This distortion increases with frequency and is in the neighborhood of 4% at 3000 cycles.

In transmission equipment, the total harmonic distortion is 1% or less through the useful frequency and volume ranges; in theater equipment this total harmonic distortion is 2% or less at

(*Continued on page* 28)

SUPER H.I. CARBON ARC LAMPS

(*Continued from preceding page*)

jection. The M-R Type 250 process projection lamphouse meets the requirements.

As illustrated in Fig. 2, the unit has a water-cooled positive brush assembly. There is a flow indicator on the rear of the lamphouse which shows that the water is circulating. The water passes through a radiator similar to one used on an automobile and is re-circulated. The same cooling system may be used for re-circulating the water around the relay condenser lens in the optical train.

The position of the positive carbon in relation to the condenser is maintained by means of a photocell relay control. Adjusting screws are provided to control the protrusion of the positive carbon plus vertical and horizontal negative-positive carbon alignment. The arc length is controlled by a separate negative feed motor which is operated on a resistance balanced control and is actuated by arc voltage.

The control panel includes meters for indicating arc voltage, line voltage and arc current. A ground glass screen shows the image of the arc. An indicator device shows in inches the burning of the positive carbon.

Although a water cell is used in the optical train to filter out some of the heat rays and an air jet is used against the film (Fig. 3), there still is a heat problem at top current, especially with black-and-white films.

A great deal of research work is being done on this problem. Higher intrinsic brilliancy and still higher current capacity carbons are available. Mole-Richardson Co. is conducting experiments with these new carbons, thus the M-R Type 250 lamp may be modified to use them when the heat-on-film problem has been overcome.

Prefab Theatre Projection Setup

Novel Crest Theatre (Long Beach, Calif.) Tops in Design, Facilities



By R. H. McCULLOUGH

Fox West Coast Theatres
Design Engineer, Crest Theatre

THE Crest Theatre in Long Beach, Calif. is one of the first prefabricated theatres to be erected in the world. All of the units above the foundation are prefabricated. The projection room walls, partitions and ceiling are constructed of gypsum panels which are bolted in place and are of tongue-and-groove nature. Fiberglas is used to insulate the ceiling for noise absorption. The gypsum panels are 3 inches thick and have a 4-hour fire rating.

The projection room is 12 feet deep 24 feet wide, with an 8½-foot ceiling height. The equipment consists of two projectors, including E-7 mechanisms, Super Simplex bases, Magnarc projector lamps, special preview equipment, Brenograph effect projector and spotlamp equipment. The rewind bench accommodates a motor rewind and hand rewinds, also 22 film compartments with fluorescent lighting illumination above the compartments. There is sufficient storage space in this film rewind bench for tools, carbons, *etc.*

In cities where rewinding is not permitted in the projection room, ample space has been provided adjacent to the projection room for this purpose. The projection room is located at the rear of the stadium section, with easily accessible entrance and exit. A film elevator has been installed and is motor-operated to carry films from the first floor to the projection room.

Switching Control Panels

There are three switching control panels with full control over all house lighting, dimmer controls, switches for projector motors, dousers, stage curtains, rectifiers and effect machines. Three control panels are interconnected to a gutter, which includes the sound equipment wiring and also D.C. wiring for the projector arcs and effect projectors.

All circuits which control the projectors and sound equipment are plugged in on the front wall panel. The entire front wall electrical panel is prefabricated and is merely set in place and connected to the main terminals. *No fuses are used in any part of the theatre or projection room,* circuit breakers being used instead. The dimmers for the house lighting and curtain lighting are remotely controlled and are motor operated.

The 4-Star Simplex sound equipment has 150 watts output, with a link circuit connected to a fader control in the auditorium. The sound equipment has dual amplification to take care of any emergency which may arise in any one of the amplifiers. A specially built public address system has been installed with a two-way microphone hookup between the stage and the projection room.

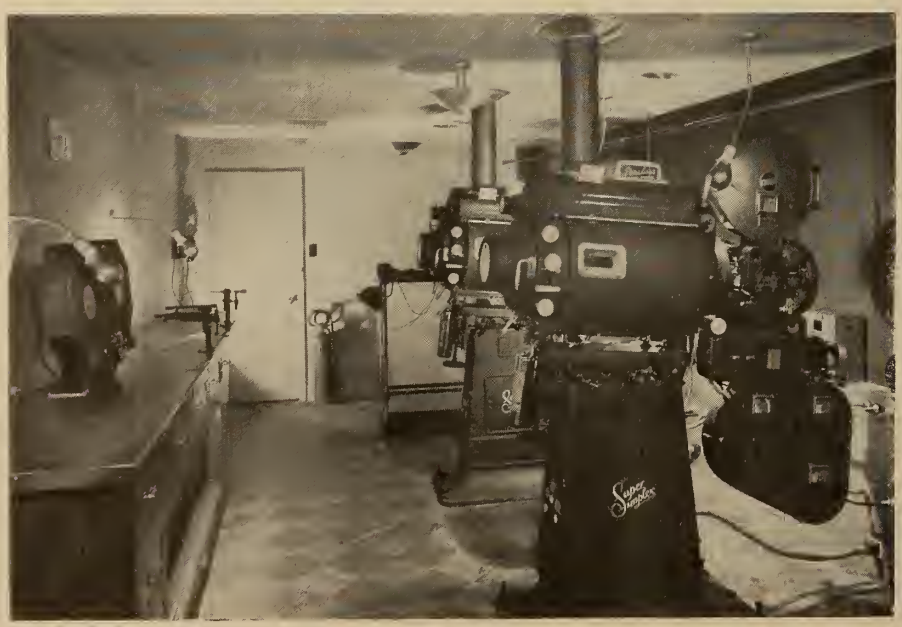
Propector ports are equipped with Huff optical glass, which eliminates reflection to a great extent. The projector ports are 10 x 10 inches in size, with the observation ports 12 x 15 inches. The throw from the projectors to the projection screen is 135 feet, with a 23-foot picture, and the angle of projection is approximately 4 degrees.

Heating, Ventilating System

The projection room has a special heating and ventilating system, including refrigeration. A special exhaust system has been provided for the projector lamps independent of the main room exhaust system. The intake of fresh air has been estimated acurately to provide fresh air to this projection room at all times. The fire equipment consists of two C-O and four Pyrene fire extinguishers. Fire shutters are controlled by fusible links at the top of each magazine, and by a manual link at each entrance and exit door.

D.C. supply is provided by a new type rugged, dry-disc magnesium copper sulphide rectifier[1], which is capable of withstanding shocks, vibrations, momentary overloads and line surges, and has superior ability to withstand high temperatures. This new type rectifier is a McColpin-Christie and has a 3-phase, full-wave bridge circuit, with 6-phase full rectification which gives a smooth D.C. output with negligible ripple. The D.C. output can be adjusted by a knob which operates a rotary tap switch connected in the primary transformer circuit. There is a magnetic contactor with overload protection and also thermal protection against overheating. There are four of these rectifiers in use, one

Crest projection room, 12 ft. deep by 24 ft. wide, includes Simplex E-7 projectors, Super bases, Magnarc lamps, Simplex sound system (150 watts output), Brenograph effect machine, spotlight, and a separate p. a. system. Note rewind bench with recessed film cabinets illuminated directly above. Fiberglas ceiling is 8 ft., 6 in. high. Room is absolutely noiseproof, air conditioned, and has separate heating system. Projector circuits are plugged to prefabricated front wall panel. Lamps separately ventilated, with room having separate exhaust with outside air intake. Portable ceiling work light between projectors. Huff Orthoscope lens system and port glass.



[1] "A 6-Phase, Full-Wave Rectifier"; I. P. for Dec., 1946, p. 16.





He holds the reins on sound . . .

• As a skilled horseman controls a horse by his touch on the reins . . . now light, now firm, giving, taking—so does the production sound mixer control sound . . . amplifying, modulating . . . correlating sound with action in proper perspective.

In this day when the reality of sound must be absolute, the mixer's work has high importance. His knowledge of his art must be complete, his skill in using it great . . . for on him depends much of a picture's power to move and hold an audience.

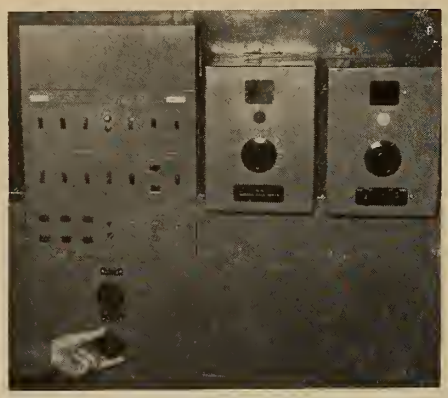
And the mixer's skill is enhanced by working with films which assure faithful reproduction of sound . . . a quality which is so well provided by the family of Eastman sound films.

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Rectifiers, projector motors and dowsers are controlled from top of front wall panel; center section controls stage curtains; lower panel includes houselights and front curtains. Small mercury switches are remote-controlled dimmer switches. At right is sound system fader, while at extreme right is the link circuit fader which is connected to auditorium fader.

for each projector lamp and two for the Brenograph effect projector.

A Walker plastic projection screen has been installed and Super Cinephor lenses are used. The Huff Orthoscope lens system has been adapted to the regular lens system, which affords even illumination over the projection screen area. The Walker projection screen has been installed in such a manner to afford good visibility at all angles. The screen masking is a deep maroon velour, and the carpet on the stage in front of the projection screen is a dark blue color.

The electrical installation includes an emergency gasoline operated generator set, which is single- and 3-phase, and is operated automatically when the power or lighting service ceases to function.

There are five projectionists employed in the Crest Theatre: Gilbert Lahlum, chief; Donald Long, Arthur Wiley, Frank Petrich and Wayne Swank. Special locker and rest rooms have been provided for the projectionists, also all lavatory facilities. A special work room has been provided with vises and the proper tools so equipment repairs can be made at any time.

Fiberglas Acoustical Absorption

Instead of using plaster in the auditorium wall and ceiling areas, Fiberglas is used for acoustical absorption. A report of reverberation time measurements has been made by the Erpi division of Western Electric Co. and the optimum and measured reverberation times, together with the calculated coefficients of absorption of the glass wool material are given in Table A.

This being the first time Fiberglas has been used for acoustical absorption, the writer thought it advisable to provide these coefficients for the benefit of the industry. The sound reproduction in the Crest Theatre is outstanding in every respect. Every seat in the auditorium is a good seat.

'Transvox' Selective Expansion

A special attachment has been affixed to the sound system, with selective expansion. This equipment is called "Transvox". The Transvox frequency response curve is continuously variable throughout the entire audio spectrum with a 12 db range. This is the first theatre in which the selective expansion circuit has been installed and by the use of this circuit the entire audio of sound reproduction is brightened and broadened 100%. The Transvox equipment is not on the market at the present time as it is still in the experimental stage, although the results are quite convincing and such an attachment will prove to be an automatic fader or an acoustical correction device in the future.

Anyone interested in the construction of this theatre can get in touch with the writer, R. H. McCullough, at Fox West Coast Theatres, 1609 West Washington Boulevard, Los Angeles 7, Calif. He will be glad to give further information in connection with the construction of this theatre.

TABLE A

Freq. in Cycles per Sec.	Optimum Reverberation Time	Measured Reverberation Time Averages	Glass Wool Absorption Coefficients
50	2.50	1.47	.40
60	2.40	1.45	.41
80	2.20	1.38	.42
100	2.10	1.37	.43
125	2.01	1.28	.45
250	1.70	1.17	.49
500	1.46	1.14	.50
1000	1.38	1.06	.52
2000	1.38	1.06	.52
3000	1.38	1.05	.53
4000	1.38	1.02	.55
5000	...	1.06	.52
6000	...	.99	.57
7000	...	.95	.60
8000	...	.83	.66

Gilbert Lahlum, chief projectionist (also B. A. of I. A. Local 521), demonstrates how rectifiers are easily disconnected from prefab panel. Units are mounted on rubber wheels for mobility in servicing.



New Ampro 'Premier 20' 16-mm Sound Projector

A new 16-mm sound projector, the Premier 20, compact and easily portable for home use, classrooms, industry, and average-size auditoria, is announced by Ampro Corp., Chicago, for March 15 delivery. The unit is equipped for both silent and sound film speeds, still pictures and reverse operation, with switches readily accessible on a centralized control plate.

Standard pre-focused lamps, up to 1000 watts, are used. Coated F:1.6 lenses are standard, easily replaceable by either 1, 1½, 2½, 3, 3½ or 4-inch coated lenses. The sound optical system projects light from the exciter lamp directly through a semi-cylindrical lens, eliminating the mechanical slit and its attendant error.

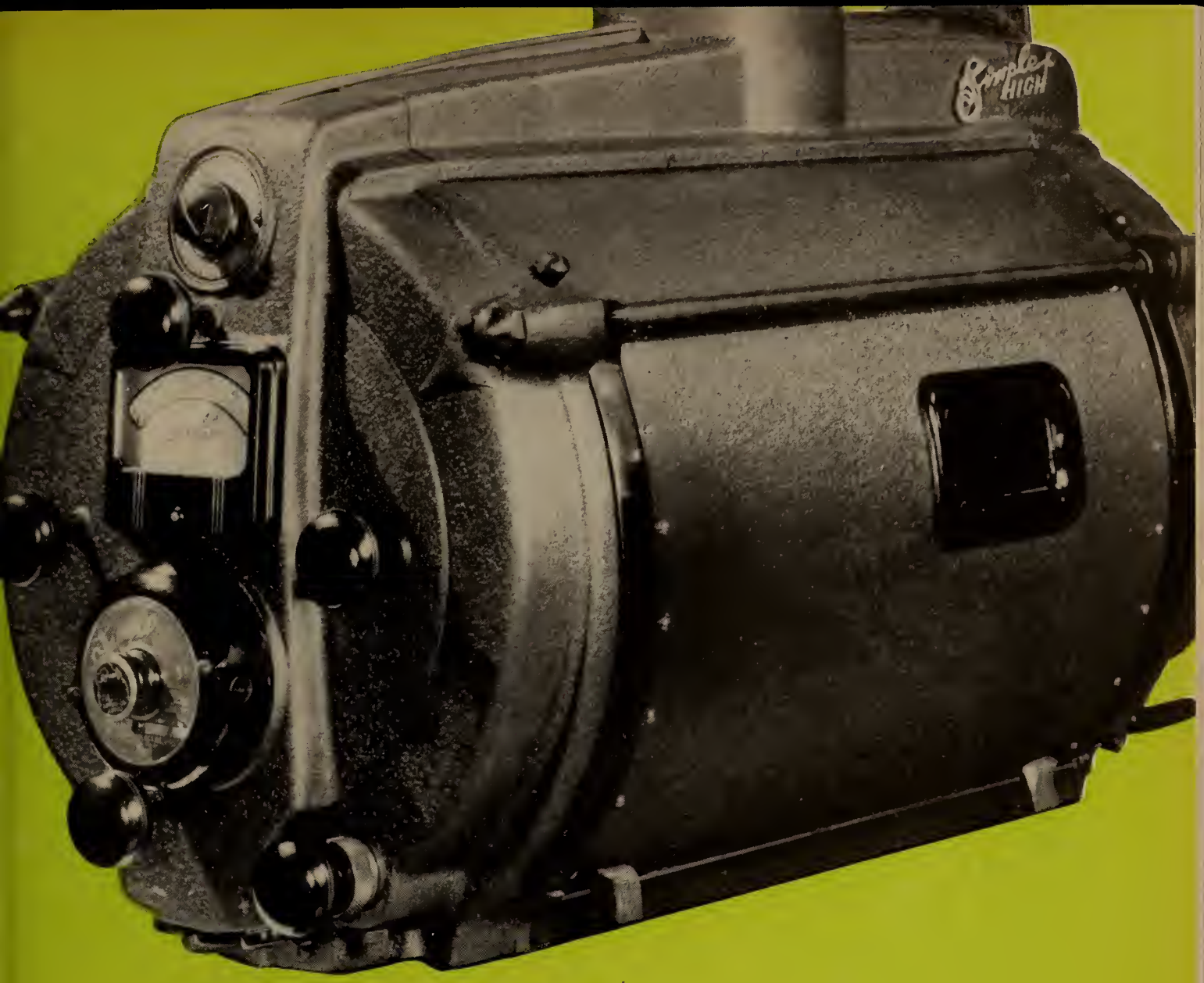
Many Operational Features

A new feature is the swing-out gate which permits easy inspection and cleaning of the aperture plate and pressure shoe without disturbing lens focus. Other features include: long-wearing roller sprocket shoe assembly which opens and closes automatically with the film gate for easy, quick threading; quick-centering tilting control knob, and fast automatic rewind.

The Premier 20 operates on 50-60 cycle, 105-125 volts A.C., and can be used with a converter on D.C. current for the amplifier only. Projector motor operates on either A.C. or D.C. Complete unit includes projector, speaker, lens, lamps, a 1600-foot reel and standard accessories. A 12-inch Jensen P.M. speaker is standard.

Huge U. S. Patent Backlog

A huge backlog of patent applications awaiting action, many of them film items, is reported by the U. S. Patent Office. The agency reported an 81 per cent increase in applications during the past year, with prospects gloomy that the situation will ease soon. Total number of applications awaiting action is 117,934, as compared with 64,890 at the same period of 1945.



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Television, Films and the Human Eye

By DR. ALBERT ROSE

RCA Laboratories, Princeton, New Jersey

Research reveals that the television image Orthicon tube and the eye are equally sensitive, far surpassing the fastest photographic film in its response to light.

A MOVIE patron steps from the bright outdoors into the dim interior of a theater. Some moments elapse before his eyes become sufficiently adapted to the dark to guide him to a seat. The seat he chooses is circumscribed—within limits. He cannot, for example, approach within arm's length of the screen with the intent of determining whether the heroine wears 60- or 80-mesh sheer hose, for by design the seats stop thirty or more feet short of the screen.

The viewer of a home television receiver is not subject to the same limitations. The aim, at least, is that he may view his picture with enough light in the room to see comfortably. There is, moreover, no barrier to prevent him from taking his seat where he can exhaust the last particle of picture detail.

Both these considerations, *i.e.*, picture brightness and viewing distance, determine the technical standards that a picture must meet in order to be judged satisfactory by the eye. Both are more severe for a television picture than for a motion picture.

Because the judgment of picture quality is made by the eye, it is highly desirable to be able to specify the performance of the eye quantitatively and in such terms or units as will allow ready comparison with the performance of motion picture film or a television system.

The problem of choosing a performance scale that can be applied with equal validity to motion picture film, the eye and television pickup tubes is considerably simplified by the fact that all three devices are subject ultimately to the same limitations. These limitations are set by the statistical fluctuations in the absorption of light.

The fluctuations can give rise to graininess in films, to "noise" in a television picture, and to limited halftone discrimination in the eye. They also permit a unified approach to performance evaluations—an approach the technical economy of which can readily be appreciated since only a single number, corresponding to the light efficiency, is needed to specify the performance range of a well designed picture pickup device. And this statement holds equally for the eye, photographic film and pickup tubes.

Here, in brief, are a few of the conclusions to which the aforementioned unified approach leads.

More Sensitive Than Film

The sensitivity of the image orthicon and the human eye are approximately equal and each is about ten times as sensitive as photographic film. The comparison pictures in Fig. 1, when properly interpreted, support the factor of ten between image orthicon and film sensitivity. At two foot-lamberts, both pickup tube and film can record pictures. At lower scene brightnesses, only the pictures transmitted by the image orthicon are present.

The fact that motion pictures are viewed at less than one-tenth the brightness at which the original camera recorded them is in support of the increased sensitivity of the eye over film.

The discrimination of the eye (for halftones and resolution) is enhanced when looking at brighter pictures. This means that both television pictures and motion pictures must improve their quality hand-in-hand with their brightness. Because television pictures, in order to be viewed in moderately lighted surroundings, are likely to be brighter than motion pictures, the quality of the television picture should exceed that of the motion picture.

This burden of improved quality is passed on mostly to the television pickup tube, in that improved quality needs more illumination in the original scene or, preferably, more sensitivity in the pickup tube.

A particularly interesting problem arises when the original scene to be picked up is not as bright as the picture reproduced on the kinescope. For this picture to be judged satisfactory, pickup tube performance must exceed the performance of the eye in the same proportion as the kinescope brightness exceeds that of the original scene.

Much confusion has been generated by comparing the "limiting resolution" of motion pictures with the number of lines of a television picture. The conclusion has usually been that a motion picture is two or three times, as the case may be, better than a television picture because the limiting resolution of film is 1,000 to 1,500 lines and the number of lines in a television picture is only 500. This conclusion is at least misleading.

The limiting resolution of a picture is not as important in the eye's judgment as is the response, or signal-to-

(*Continued on page* 16)



FIGURE 1

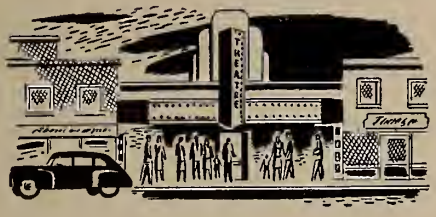
These photographs show the increased efficiency of the image orthicon over the most sensitive film under normal and low lighting conditions. Picture on left side of each film square shows the image as picked up by orthicon and photographed direct from kinescope. Picture on right of each square is the image as recorded by camera. Only when light was maximum was film able to record an image, although orthicon tube was successful when illumination was reduced 99 percent. Figures under each square indicate relative intensity of light.

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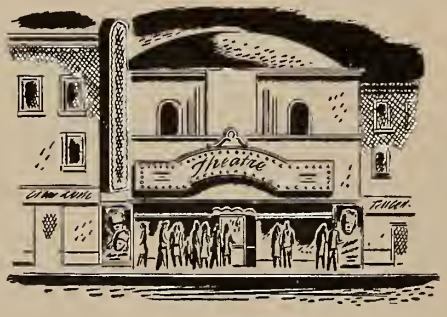


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Trade Unions in America

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

IV

PRECEDING installments in this series have presented a brief and sketchy story of the origin of Greek and Roman craft unions. The picture has not been filled in, frankly for lack of sufficient dependable historic material. The writers of antiquity gave us no filled-out story. They paid but passing notice, if any, to the outstanding part being played by the crafts. There is reference, but unfortunately little indeed to prove helpful, to the craft organization during the Golden Age of Greece, as active as the one which developed in Rome.

From notes made by Mrs. W. H. Buckler, wife of a prominent American archaeologist, while studying ancient craft unions in Greece, the appended quotation is given. After referring to the law of Solon, Mrs. Buckler wrote:

"According to Diodorus, Themistocles pursued the same policy, and in the Golden Age similar statements are attributed to Thucydides and Plutarch and to Pericles. Thucydides makes Pericles admit that the same men can work after their own interests and that of the State simultaneously, an idea which Plato afterward combated. What Pericles had in mind was that the craft unions could protect their craft interests and that these did not run counter to the welfare of the State."

It has been possible from an examination of inscriptions and scanty reference by writers of the period to learn some definite facts. In Greece and Rome the workers were free men, they were citizens. The crafts organized not as a result of a plan which theorists had evolved, a blueprint such as has been so frequently presented to workers in recent years by professional and other reformers. They organized because they were thrown together, because of common interests, and without doubt principally because of sheer necessity. They were self-organized.

Enduring Policies Evolved

The ancient crafts evolved policies and practices afterward applied by the craft guilds of the Middle Ages and by our present trade union movement. This was so because of the natural consequences of creating organizations by workmen, for the workmen. The craft guilds of the Middle Ages, with possibly one exception, the stone cutters and masons, were unaware that they had been preceded by the craft unions of antiquity. Perhaps in the trade union movement of today there may be found members unaware that 2500 years ago there was a vigorous trade union movement whose members

(*Continued on page* 31)

TELE, FILMS AND HUMAN EYE

(*Continued from page* 14)

noise ratio, for 500 lines and below. A more valid comparison of television and motion pictures, based on signal-to-noise ratios, places the capabilities of a 500-line television picture close to the resolution of present 35-mm motion picture film.

Major Problem for Films

The evaluation of the graininess of motion pictures has been a major problem in the film industry as evidenced by the many technical papers on this subject throughout the last quarter century. The television art is faced with the same problem in the evaluation of noise in television pictures.

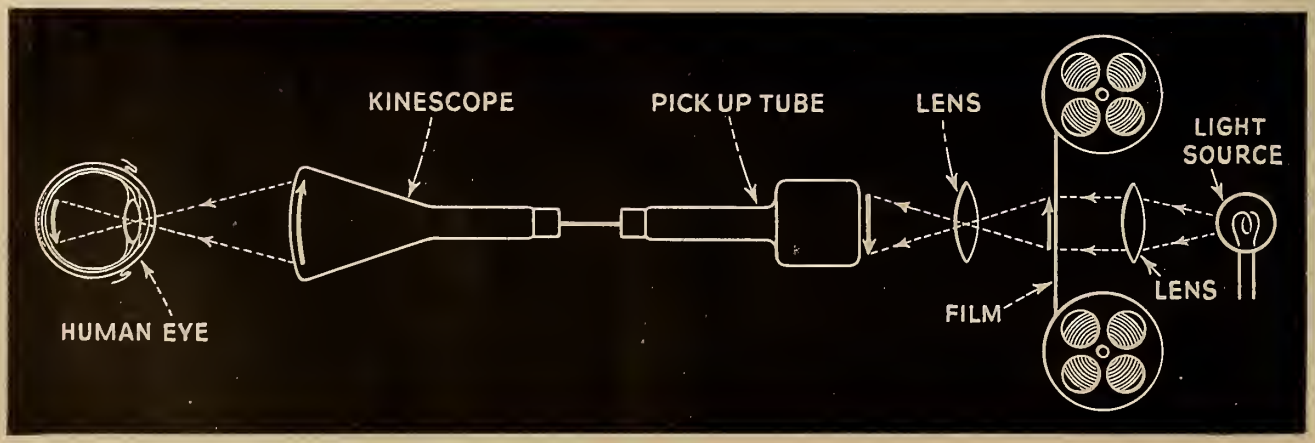
Only very recently has there been an appreciation that the complete treatment of this problem requires a knowledge of the properties of the eye as thorough as the knowledge of the properties of the motion picture or television picture. It is of considerable help that the eye appears to be limited by fluctuation phenomena in much the same way as film or television pickup tubes.

One might expect, if the eye is limited by fluctuation phenomena, to be able to "see noise"—that is, "visual noise"—similar to the noise in a television picture or graininess in a motion picture. The writer is convinced that such visual noise is readily observable at very low levels of scene brightness, around 1/10,000 foot-lamberts. A white surface then seems to take on a fluctuating grainy appearance.

Other conclusions have resulted from the treatment of the eye in the same terms as pickup tubes and film. For example, the large range of dark adaptation (the ability of the eye to re-adjust itself to see scenes 10,000 times below normal brightness levels) can be interpreted as arising from a "gain control" mechanism in series with the retina and brain and not unlike the volume control knob on a television receiver. Further, existing data on the eye suggest that the gain control operates selectively more on blue light than on red light.

The accurate comparison of the performance of film and pickup tubes with the performance of the eye cannot but enhance one's admiration for the nicety of design that has gone into the human eye by chance selection. At the same time, one has firm grounds for expecting even to surpass the performance of the eye by deliberate design of pickup devices.

FIGURE 2. Essential parts of a television system when a filmed scene is to be transmitted and reproduced.



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Elements of PROJECTION OPTICS

By DR. ANGELO MONTANI

Consulting Engineer, New York City

HERE is a simple procedure to find the exact focal length of a projection lens or, in fact, any lens. This can be achieved without knowing anything about the lens itself—for example, the number of elements, speed, symmetric or asymmetric construction. Of course, the procedure is always useful when it comes to a lens which is unmounted or one which does not have any marking whatever engraved on the barrel.

Take an opaque cardboard, preferably black, and with the point of a sharp knife make a couple of slits of about ½ inch long and ¼ inch apart as shown in Fig. 1a. Position behind it a frosted light blub. Not less than 3 feet away from the cardboard and facing it locate a ground glass of the type used in plate cameras. The frosted side of the glass should face the cardboard.

The lens under test is first kept near the cardboard and then slowly moved away until an enlarged sharp image of the two slits is focused on the ground glass. The location of a point of the lens is recorded: for example, how far one of the rims of the barrel is from the cardboard. Now the lens is moved again toward the ground glass until a new sharp image of the slits appears focused on the ground glass. This time the image will be reduced in size. Now look at Fig. 1b: again the position of the same point of the barrel is recorded.

Now, collect the data. Measure in inches the fixed distance between cardboard and the ground side of the glass and designate it "D". Then measure, also in inches, how much the lens has been displaced between the two positions yielding the enlarged and the reduced image, and call the new distance "d". The formula that gives the focal length in inches of the lens is:

$$\text{Focal length} = \frac{D^2 - d^2}{4D} \text{ inches.}$$

This formula is read "Capital D square minus small d square, divided by four times capital D."

Let us now apply the formula to the following experimental data. The distance between the cardboard and the grounded side of the glass is 40 inches. The distance we had to move a particular lens to obtain the two images as specified above was 30 inches. What is the focal length of the lens?

$$\text{Focal length} = \frac{40^2 - 30^2}{4 \times 40} =$$

$$\frac{40 \times 40 - 30 \times 30}{4 \times 40} =$$

$$\frac{1600 - 900}{160} = \frac{700}{160} = 4\tfrac{3}{8} \text{ inches.}$$

The accuracy of the evaluation of the focal length depends on the care employed in the measurement of the distance between the cardboard and the ground face of the glass and of the linear displacement of the lens tested.

Figure 2 illustrates the path that some of the most representative rays follow going from the film to the projected image. We can see at once that if we should reduce the distance between the planes P_1 and P_2, called the principal planes of the lens, until they coincide, the rays coming through the left side of the lens would match the rays going out through the right side. In fact, disregarding the distance between P_1 and P_2, we can write:

$$\frac{\text{Screen size}}{\text{Film size}} = \frac{\text{Distance from } P_1 \text{ to screen}}{\text{Distance from } P_2 \text{ to film.}}$$

This is a very useful relation since it determines what focal length lens has to be chosen to fill a screen at a predetermined distance. The lens manufacturers have already prepared tables which indicate at a glance the focal length that the projectionist must choose for every instance and therefore we are not going to apply the formula to a computation. Only purpose was to indicate how those tables are computed.

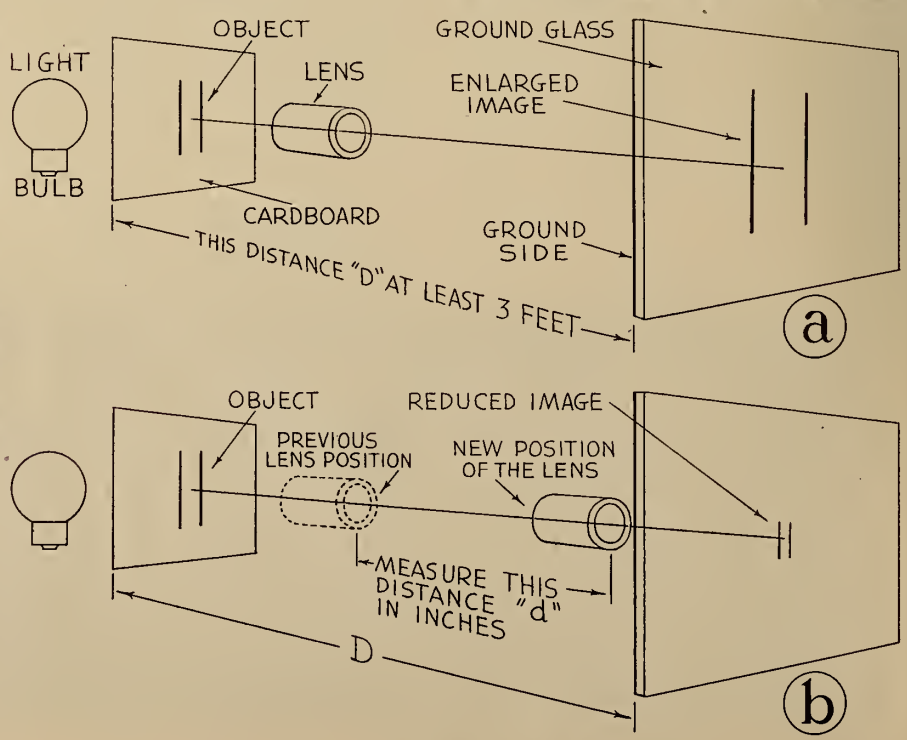
The procedures given and the hint about the size of the images in relation to the focal length are based on that which is called the "focal length equation." We are not writing this equation because in its simplified form (which even today is found in college textbooks) is highly inaccurate as it does not take into consideration the lens thickness which is always a considerable amount of the focal length. The correct form is considered beyond the scope of the present exposition; also, it would be of little use to the projectionist.

Composition of Lens Image

Considering how a lens forms the image of an object, we may state broadly that the lens picks up point by point on one side the light received by the object and reproduces those points on the other side. Each reproduced point is in the same relative geometric sequence in the image as it was on the object, and of the same color and light value. Of course, we are now considering, for our purpose, a perfect lens.

That which it is desired to stress is the fact that the reproduced or projected image is constituted of a mosaic of points of light and shade and color. Actually, the elements forming the mosaic are not points, but small discs of light, their

FIGURE 1



diameter being determined by the correction of the lens, its optical diameter, the accuracy of the focusing, and the color of the light which corresponds to the particular disc. The reason that we see continuously an image which in reality is formed by literally billions of separate dots is due to the limited resolving power of the eye.

A lens reproduces an image by dots, just as pictures are reproduced in newspapers, except that the dots formed by a lens are practically a thousandth of that size.

Every projectionist knows how the projected image cannot be precisely focused from the projection room because the latter is generally located too far from the screen. Above a certain distance the variations in sharpness due to the correct focus or near-to the focus setting cannot be easily detected by the eye. A common expedient is to have a person standing about the middle of the auditorium as the projectionist shifts the objective back and forth, flashing signals according to a predetermined code.

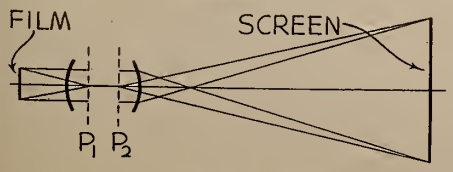
The reader must familiarize himself with the almost intuitive notion of "angular distance," which is a perspective way of interpreting the linear distance in the common sense of the word (see Fig. 3).

The length of a page of INTERNATIONAL PROJECTIONIST is 11½ inches, and of course, it remains the same size, no matter if it be read 10 inches away from the eyes or 20 inches. Nevertheless, its angular distance is 60 degrees in the first position, and only 32 degrees in the second. At five feet away one might still be able to read the small print, but at ten feet each word would look like a short straight segment. At 20 feet even the space between the words would no longer be perceived and the printed line would appear continuous without any trace of words.

The angular distance of the page now would be so reduced that small printed characters would fall below the power of discrimination of the eye. At a distance of about 3,440 feet not even the page would be visible any more. As a matter of fact, we are able to see an object until its distance from us is less than 3,440 times its largest diameter. This means that the eye cannot perceive angular distances smaller than one minute, which is 1/60th of a degree.

As a consequence, the images projected by the lens will be amply satisfactory when the smallest details photographed

FIGURE 2



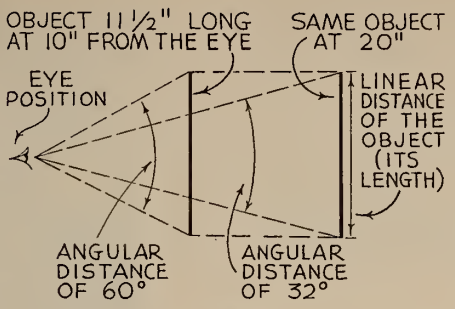


FIGURE 3

on the film are reproduced on the screen with a halo of fuzziness which is below one minute angular distance from the spectators in the front rows. In other words, it is not necessary that a lens, projection or photographic, should reproduce the images with infinite precision.

In all optical devices which generally are to be used in connection with the eye, the last word is with the latter: the eye must be satisfied. At the same time it is useless to design lenses for results which are above the perceptive ability of the most discriminating eye.

Apropos the subject of the physiology of the eye in connection with motion picture projection, it is advisable to say a few words on the complex phenomenon of flicker. Probably every projectionist at the beginning of his career has inquired as to the purpose of the intercepting blades of the rotating shutter. The reason for the working blade is evident since it is during its passage through the beam of light that the frame is changed. The unsatisfactory answer that the projectionist received and in turn repeated thereafter to the trainee is: "to reduce the flicker."

The successive projection of 16 frames per second is sufficient to give to the eye the illusion of motion, since the images follow so rapidly that they fuse one into the other. Therefore, 16 times in a second the working blade must shut off the light to allow the switching of the frames. Now, a light which goes on and off 16 times every second is very annoying to the eye, which would start immediately to become fatigued, since during the period of darkness the eye shifts its direction of sight and its focusing accommodation.

Experiments show that if the frequency of interception of the light be increased to about 40 to 50 times per second, the eye does not have the faculty of perceiving a discontinuity between the periods of darkness but rather just a steady decrease in the intensity of the total light.

Therefore, an old 16-frame projector needs two extra intercepting blades, besides the working one, to increase the interceptions of the light to the frequency of 48 per second. The sound projectors which run at 24 frames per second need, therefore, only one extra blade to reach the proper frequency of interception of the light.

Rotating shutters are a necessary evil which we are forced to utilize in the projector mechanism; in fact, they reduce the amount of "useful light" which the lens system passes. Actually, during the time any one of the blades cuts off the beam the arc might just as well be off.

Shutters could be eliminated if the number of projected frames should be increased to 48 per second, but this, in turn, would entail a double length of film. Nevertheless, shutters will certainly disappear when a stroboscopic light, comparable in brightness with the carbon arc, is perfected. A stroboscopic light is one which flashes at regular intervals.

Optical Surfaces Cleaned by Electronic Bombardment

Electronic bombardment, a new method of cleaning optical glass surfaces prior to coating, was the subject of a paper delivered by C. H. Alexander, of Busch & Lomb Optical Co., at the recent Winter meeting of the Optical Society of America. The process was designed primarily for aiding application of aluminum, the reflecting agent, to television and other first-surface precision mirrors.

The ground and polished optical glass is placed in a metal holder in a high vacuum bell, where a tungsten filament, similar to that in an ordinary electric light bulb, is electrically heated to a temperature at which electrons are "boiled out." Since electrons are negative particles, they are attracted by the holder which is at high-plus voltage with respect to the filament. Thus attracted, the elecrons bombard the glass at a speed of several thousand miles a second, leaving the surface entirely free of water and extraneous material.

After cleaning, the glass, still contained in the high-vacuum chamber, is coated with aluminum by an evaporation process. The result: a mirror of extremely high precision such as required for televising and other purposes.

Electrons Bombard Moisture Molecules

When the glass is placed in the vacuum bell, an unnoticeable residue of moisture several molecules thick, always present on any surface, remains. This can be removed only by applying heat. However, aluminum will not adhere to a heated surface, and the electronic bombardment method was developed to overcome that difficulty.

Unlike other heating methods, electronic bombardment heats only the surface of the mirror, which almost instantaneously cools to the temperature of the remainder of the glass. The aluminum coating, applied after this treatment, will adhere.

Like most precision mirrors, television reflectors are coated on the front, or first, surface. The ordinary "looking-glass" type of mirror is coated on the back. Application of aluminum or other reflecting agent to the first surface eliminates an almost imperceptible but nevertheless actual dual reflection of the image.

Warner Brothers' Stock Holdings

Harry M., Jack L. and Maj. Albert Warner as of December 2, 1946, held a total of 1,293,500 shares of Warner Brothers common stock. These shares have a market value of about $22,000,000. There are 7,402,180 shares outstanding.

IN THE SPOTLIGHT



By *HARRY SHERMAN*

WE HAVE heard of ridiculous offers made to Local Unions in wage negotiations but the one made by the theatre owners of the Louisville, Ky., suburban theatres to the officials of Louisville Local 163 tops them all. According to John P. Flaherty, business agent of the Local, the exhibitors offered a *14c per day* increase to the projectionists provided they carried the film downstairs from the projection room every night after the show. And these same exhibitors held a meeting prior to their "generous" offer to the union in which it was decided to raise admission prices to their theatres. Needless to say, the offer, which the union officials will remember in future negotiations, was rejected.

● Our I. A. men certainly do get around. Merle E. Bragg, member of Honolulu Local 665 and first-class electrician at the Navy Yard, Pearl Harbor, recently returned from an 8-weeks' trip for the Navy Department which took in the islands of Guam, Valmyra, Canton, Fiji, and Samoa. In a letter to this department, Bragg states that he expects to be transferred to the Army Transport Service as civil service chief electrician and his first assignment probably will be in Japan. Island-hopping, eh?

● Vancouver, Canada, Local 348 is in the midst of wage negotiations with the theatre exhibitors in its jurisdiction. Not having received any increase since 1941, the Local is asking for a 30c per hour wage increase plus time and one-half for overtime, and two weeks vacation with pay. The proposed increase will bring the top scale to $2 per hour ($1.96 per hour in suburban houses).

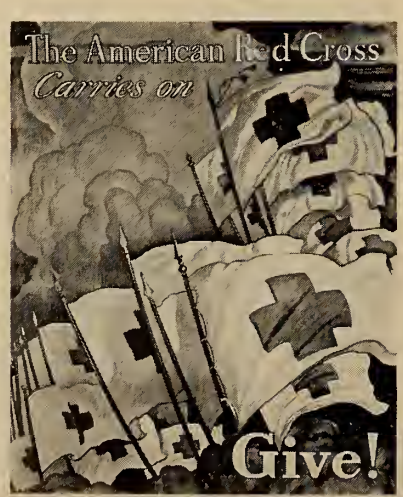
In spite of a 100% increase in business during the war years, Local 348 maintained the "no-strike" pledge of the A. F. of L. and abided by the rulings of the War Labor Boards. Since the removal of government controls living costs have soared and the members of Local 348 find themselves in a worse economic condition today than in 1941, says George Thrift, secretary of the Local.

The Vancouver Local prides itself on the two-men condition in effect in British Columbia. One of the major circuits offered to sign a three-year contract at an increase in wages provided the Local agreed to a change in government regulations that would allow one-man operation in all houses under 1,000 seats. The offer was promptly turned down.

The jurisdiction of Local 348 takes in a vast territory extending 500 miles to the north of Vancouver and 400 miles to the east. During the war years when the manpower shortage was a serious problem for the theatre owners, all the theatres were kept in continuous operation at considerable expense to the Local. The memories of these exhibitors have to be prodded every once in a while—they forget so easily.

● Harry Abbott, popular theatre supply dealer and Motiograph representative in Chicago, can pick our raffle tickets any time. Recently at a Variety Club ball Harry won a Packard automobile and a radio. Lucky guy!

● We are glad to welcome to the editorial pages of I. P. our old friend R. H. (Russ) McCullough, member of Los Angeles Local 150 and Director of Television and Pre-fashioned Theatres for the National Theatres Amusement Co. The first motion picture theatre to be constructed of prefabricated units, the Crest Theatre in Long Beach, Calif., was recently completed under the direction of McCullough. Elsewhere in this issue is his own story describing in detail the many novel features of the specially built projection room and its installations. Particular reference is made to the Huff Orthoscope lens system used in the Crest's projection setup. Quite a few of the Huff products are used in the projection room.



● Walter Diehl, business agent for Boston Local 182, reports that five of his members — Nat Max, Jack Kaufman, Morris A. Goldman, Myer Bixgorne, and James O'Brien — received diamond-studded service pins from Loew's, Inc. Nat Max heads the list with 33 years continuous service with the circuit. Charles Kurtzman, division manager for the company, presented the pins to the men at a special banquet.

● Detroit Local 199 threw a party last month in honor of its members discharged from the U. S. Armed Forces. Frank Kinsora, president of the Local, was in charge of arrangements.

● A 15% increase retroactive to January first was granted to members of San Francisco Local 162. Floyd Billingsley, business agent of the Local and 3rd vice-president of the I. A., was in charge of negotiations. Incidentally, the Local's annual ball, which was sidetracked during the war, was held last month and voted a grand affair.

● Thomas E. Shannon, member of Local 223, Providence, R. I., and projectionist at the Leroy Theatre for the past 17 years, was appointed by Mayor Ambrose P. McCoy, of Providence, to a three-man safety commission. This commission will have complete control of both police and fire departments, traffic control department, and of a department of fire alarms and police signal service wires.

In addition to his appointment to the safety commission, Tom is serving his third term as councilman from his district, holding the office of council president, and is a member of many important city council committees such as the sinking fund, finance and purchasing boards.

We have known Tommy Shannon for many years and we are not at all surprised to learn of the prominent role he

is playing in community affairs. Like many other I. A. men throughout the country, Tommy takes a keen interest in civic activities and believes that every one should take more than a passing interest in local politics.

● The newly reorganized International Projection Society of Toronto Local 173 held its first meeting recently and, from reports reaching this corner, got off to a swell start. Rex Shale, manager of Perkins Electric, Ltd., was the guest speaker of the evening and demonstrated several sound projection mechanisms. From time to time various types of projection equipment will be displayed at the meetings, thus giving manufacturers and supply dealers the opportunity to demonstrate their products directly to the men who work with them.

The officers of the Society are to be commended for the splendid efforts in helping their members keep abreast with the latest projection developments.

● The sudden death of Barney Kobel, member of Detroit Local 199 for over 30 years, came as a shock to his many friends in the I. A. He is survived by his wife and a brother.

● In fighting a film fire that broke out in the projection room of the Avalon Theatre, Lawrenceville, Ill., John Farrell, the projectionist, was overcome by the gas and smoke fumes. He was revived with the aid of a respirator and sent to the hospital for treatment. Had there been a second projectionist on duty, the fire would have been checked almost immediately and Farrell need not have risked his life to fight the flames.

● We extend our deepest sympathy to Harvard O'Loughlin, president of St. Louis Local 143 on the recent death of his wife. We met Mrs. O'Loughlin at the I. A. St. Louis Convention in 1944 and admired her greatly for her untiring activities as hostess to the women guests at the Convention.

● The projectionists running motion pictures on the Chesapeake and Ohio Railroad trains are all members of Cincinnati Local 327. John E. Krebs, business agent of the Local, took part in negotiations with the railroad company, and placed 6 of his members on the trains. The men receive union scale for this type of work, plus free meals and sleeping quarters while on duty or away from their homes. They are subject to working conditions under the Railroad Labor Act, which calls for a 40-hour five-day week. Train runs are from Cincinnati to Richmond, Va., and from Cincinnati to Washington, D. C.

● Harry Barco, business agent of St. Louis Local 143, reports that he recently completed negotiations with the new St. Louis television station KSD-TV, obtaining an agreement giving Local 143 complete charge of the installation, operation and maintenance of all projectors and slide machines used at the studio. Also, the care of all film used at the station will come under the jurisdiction of Local 143. In addition, the agreement calls for a Local 6 man to handle all props and scenery, and specifies that the photographing of all moving pictures for station KSD-TV will be handled by Local 666.

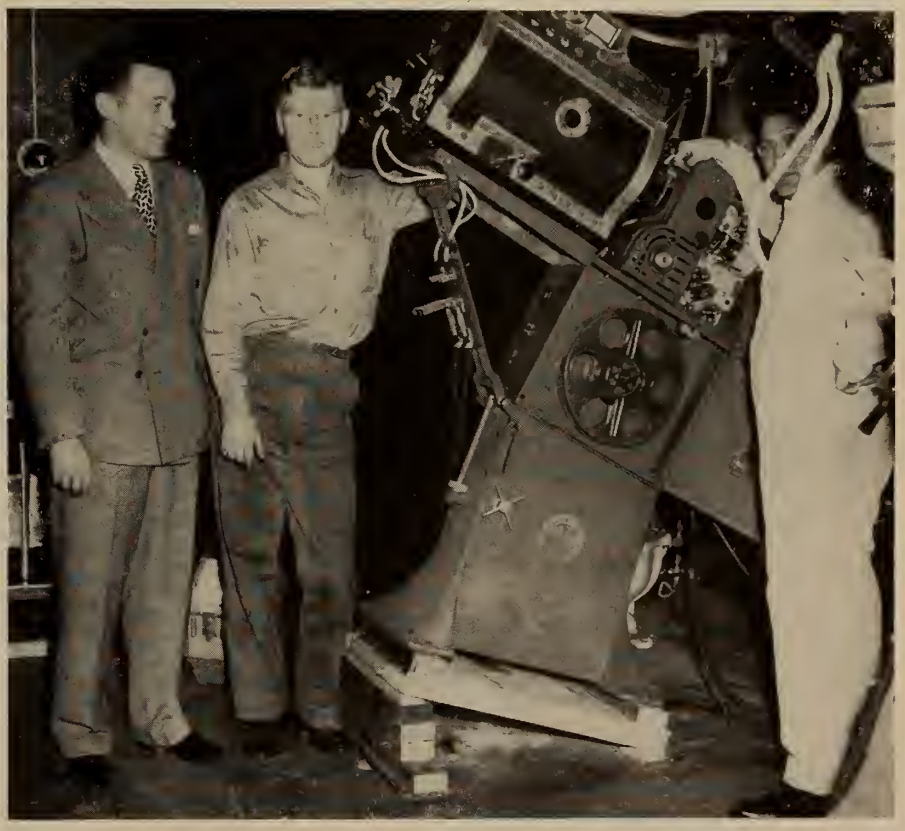
Prior to Barco's negotiations with the station, I. B. E. W. Local 1217 had an all-embracing contract to handle all work at the studio. Barco held a number of meetings with the officials of the I. B. E. W. Local on the division of work between the two unions, with the aforementioned agreement resulting therefrom.

An I. A. projectionist and an I. A. stagehand are now permanently employed at the station. Each man receives the same scale as the I. B. E. W. workers—$90 per week for a forty-hour, five-day week, time and one-half for any time worked in excess of eight hours in a given day, and double time for holidays.

This merely proves that no situation can be too tough if properly handled, and too much credit cannot be given Barco for his diplomatic handling of a delicate situation.

● West Coast studio unions are asking a Congressional investigation of the refusal of paid Red Cross employes to accept a contribution of $201,250 collected from more than 18,000 workers in the motion picture industry. "We have no quarrel with the Los Angeles Chapter of the Red Cross, which favored acceptance of the contribution," said a spokesman for the studio unions. . . . "Our difference is with the Red Cross National Central Committee, headed by Basil O'Connor." Carl Cooper, 7th I. A.

(*Continued on page* 27)



Can You Top This in Acute Projection Angles?

There's many an angle to the business of projecting motion pictures, but none more acute than the 33-degree pitch of the projection setup in the Geary Theatre, San Francisco—according to the projection staff at this old legit house. This temporary setup, atop the Geary's third balcony, is used for special roadshow films. Throw is 101 ft., screen image size 20 ft., and it was impossible to eliminate entirely the keystone effect because of undue elongation of the image. A 4¼-inch Cinephor lens is used.

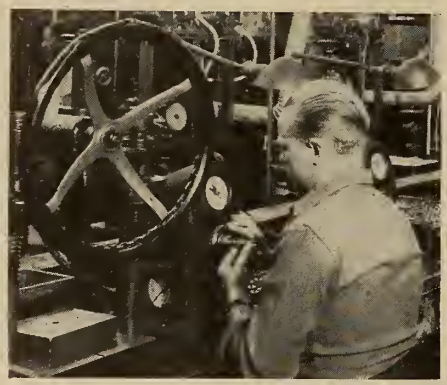
The I. A. Local 162 projection guys pictured above—A. W. Deucher, Lewis N. Howard and Dick Reed—enter this photo in the acute projection angle sweepstakes and challenge any of you projection mugs to beat their pitch. No entry deemed official unless supported by photographic evidence in I. P.



Showing vast sweep of Simplex factory main floor.

New Simplex Plant

Bloomfield, N. J., Factory is Tops in Layout, Tools and Methods for production of projectors and sound systems.



Specially contrived precision fixtures, including optical comparators and air gauges, are used for checking intermittent sprocket contour, tooth spacing and internal diameter.



Inspection of parts selected at random during setup run, as contrasted with post-production inspection. This approximates finger-tip control during the actual run.



Modern electronic test equipment affords both a visual and aural check of the intermittent movement in terms of the positioning relationship between star wheel and cam. Dial of indicating gauge is graduated in steps of 1/10,000 inch.

FEATURING modern "line" production methods, International Projector Corp.'s new plant in Bloomfield, N. J., is now operating at peak capacity. Steps in the manufacture of Simplex projectors and 4-Star sound systems were demonstrated during a recent inspection tour by trade press representatives. Occupying a 10-acre tract of land, the new Simplex plant comprises 180,000 square feet of plant and office space. The average weekly payroll lists 550 employees.

The plant is an entity in itself in that practically the only outside purchases relating to manufacturing operations are for raw materials, predominantly metal. Every step in the forming of a given part —from the initial roughing operations down through the most minute refining process to heat-treating, plating and paint spraying—is wholly an in-plant operation.

Every tool used for Simplex parts is made within the plant. And even the exacting standards governing such tool production are checked by means of special instruments such as a Bausch & Lomb Comparator which, by means of a novel process, projects on a screen the image of a given part magnified 100 times, enabling the detection of possible error of the order of 1/10,000 inch.

Cite Fine Tolerances

Simplex plant officials point out that the motion picture projector manufacturer has never been accorded adequate recognition for his strict adherence to exacting standards down through the years. Other manufacturers, notably in the automotive field, go to extreme lengths to clarion their current "close" manufacturing tolerances, of a character that has been commonplace in Simplex production procedure for the past 25 years. Tolerances of 1/10,000 inch and even finer are "musts" in motion picture technology.

Bearing out this contention is the wealth of machinery, special tools and test equipment, in addition to expert design and extensive engineering know-how, utilized to produce the finely-spun mechanism that is the motion picture projector.

Illustrative of this point is one unit 5 feet high and 4 feet long used to machine a 1-inch segment of the projector film trap! Or the 40 different operations required by Simplex standard practice to produce a single part—the intermittent sprocket! Or the 11 production steps necessary to turn out a washer that is held to a tolerance of plus or minus 2/10,000 inch! Or the 19 operations incident to producing a guide roller! Thus the character of work performed before a single assembly is made.

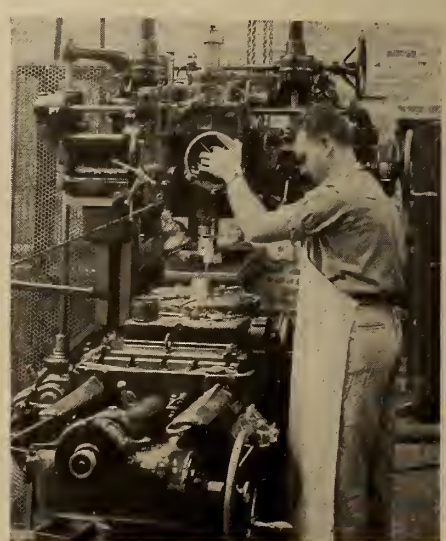
The gear-cutting department also attests to the severe Simplex standards. All needed gears are cut within the plant, Simplex having been the first projector manufacturer to introduce spiral bevel gears.

Checking being important only in terms of the degree of accuracy sought, it is noteworthy that every aspect of production for both Simplex projectors and sound systems is governed by precise written and drawn specifications, often comprising as many as ten pages for a single part, the slightest deviation from which is unacceptable.

Actual checking of each part against the applicable specs begins with the first piece off any given manufacturing setup and continues with similar checks of units selected at random during the balance of the run. This inspection during actual production run approximates finger-tip control of each operating stage, as contrasted with the conventional post-production checking of an entire lot.

Rigid Inclusive Inspection

These in-work checks by no means complete the inspection process. Intermittent movements, for example, are subjected to rigid inclusive inspection by means of delicately contrived electronic test equipment which affords both an aural and



Simplex makes its own tools. In foreground is a jig-boring machine.

visual check for accuracy of the positioning relationship between star-wheel and cam. This test unit includes a contact microphone, an amplifier, and A.C. voltmeter for checking line voltage, a wattmeter for checking power consumption (load on the movement) and an indicator graduated in steps of 1/10,000 inch.

No Simplex projector is shipped from the factory until it has been run-in thoroughly, first without the intermittent movement and then with it after all final minor adjustments have been made. Here again wattmeters are used to indicate even the slightest excess load on the mechanism.

Production of the Simplex 4-Star sound system follows the same precise pattern that governs projector manufacture, although the processes are necessarily different. Since sound system production is largely a wiring job, the light but sure touch of women workers is utilized for the more critical assembly operations.

On an upper tier extending around both sides of the manufacturing area are the executive offices, the accounting department, the engineering and design group, the planning and methods section, and a completely equipped experimental and testing laboratory. The three latter departments are concerned ceaselessly with rigorous sustained investigation of better methods for maintaining quality production and in exploring new design possibilities.

Employee welfare is a paramount concern of I. P. C. plant officials. Frequent meetings of a labor-management committee, the labor men being designated by the union, are a vital factor in maintaining employee morale and in effecting sustained high-quality production. Other socially significant activities promote organization teamwork, morale and a mutual respect between employees and management.

In addition to providing effective safety devices throughout the plant, I. P. C. maintains on the factory floor a completely equipped modern dispensary in charge of a registered nurse. This miniature hospital may be used for specific immediate needs as well as general check-ups. A spacious, gleaming cafeteria serves daily several hundred balanced luncheons and also operates two mobile feeding units which twice daily provide in-between-meal snacks to employees throughout the plant.



All Simplex projector gears are cut in the I. P. C. plant. Spiral bevel gears, first introduced in projectors by Simplex, are cut in this department.

Rapidly nearing completion is an added building wing which will house a model theatre to be used for testing all types of equipment under actual field conditions.

Good Old 90 Gold St.

Intensely pleased though they are with their fine new plant, I. P. C. executives still admit to an as yet unshakeable nostalgia for the famed old Simplex plant at 90 Gold Street in New York City. As one veteran Simplex man put it:

"We oldsters still feel a twinge when we think of 90 Gold Street because it was there that we nursed the baby Simplex through the hard days and watched it develop into the robust fellow of today.

"But advancement can only come through modern production methods and improved working conditions. In congested New York City it was possible to expand in only one direction: vertically on a multiple-floor basis. Here in Bloomfield we have the space permitting 'line' production on one floor as against 'colony' production on multiple floors in New York City.

"Simplex and 90 Gold Street have parted company, but the terms will long be synonymous in every corner of the earth. Our job now here in Bloomfield is to utilize our fine new facilities to uphold the tradition of 90 Gold Street and, if possible, to excel it by delivering even better Simplex equipment to the industry. This we pledge ourselves to do."

Carbon Developments in Germany

Appended is an abstract of Final Report 104 on the German carbon industry, as compiled by Hugh H. Wikle and Walter A. Steiner, members of the Allied Technical Industrial Intelligence Committee.

THIS report, on the Conradty, Ringsdorff, and Siemens factories (in Germany) is devoted chiefly to the production of large-diameter searchlight carbons, of 450 and 1000 amperes. Just before the war some German work had been started on the study of principles which might be usable for the improvement of lamps for motion picture purposes, but it is stated that no development took place during the war.

A limited amount of work was done with Agfacolor.

The development of the 1000-ampere searchlight required the solution of the fundamental problem of arc instability observed to occur at currents above about 400 amperes. In addition, there were other rather difficult design problems involved in this huge searchlight.

It was observed that at currents above 400 amperes the arc flame assumed a forked and rotating form, which was unusable for searchlight purposes. This phenomenon was thought to be due to the fact that at this curent density the effective negative spot reached the sublimation temperature, so that, as the spot vaporized, the arc flame jumped to the cooler adjacent part of the negative. This continual jumping of the arc caused the rotation.

The solution for this problem was to use a relatively large homogeneous negative, so positioned that the arc was at the edge of the negative, which was rotated at a speed fast enough to provide the arc with the necessary continually new negative spots, thus maintaining a fixed position of the arc itself.

To comply with military requirements, of a sharp edge to the searchlight beam, a rectangular shape of positive carbon was adopted. By positioning this rectangular carbon with the long axis vertical, it was posible to sweep the arc flame across the entire narrow face of the carbon so as to effect a relatively very uniform intensity of the entire crater. In order to minimize the size of the tail-flame, the larger German searchlights have a suction system with a nozzle only a few centimeters over the positive crater.

The positive carbon for 1000-amperes is 18- by 26-mm over the outside of the shell, and has a 14- by 22-mm hard core. The negative carbons are 24-mm in diameter and are not cored. The arc was operated at 100 volts. The intrinsic brilliancy was about 1550 candlepower per square mm. Burning rate was about 100 inches per hour, so that the net burning time of the original 32-inch length to a stub of about 10 inches was approximately 13 minutes per trim.

The positive carbon for the 450-ampere searchlight is generally similar to the 1000-ampere carbons, but it is of 24-mm diameter. The negative is 24-mm in diameter and has either a 20-mm diameter hard core, or a 12-mm and 2.5-mm duplex hard core. The arc was operated at 90 volts. The intrinsic brilliancy was about 1220 candlepower per square mm. The burning rate was approximately 32 inches per hour, giving a net burning time of around 40 minutes per trim.

Automatic Acoustic Compensator

By ROBERT A. HAINES, N.U.T.

Member, Deleterious Dilatory Didoctics

I.P. tokes pordonoble pride in presenting to the scientific world this mosterpiece of delusion. Sporing no cost, I.P. operotives waged a brilliont campaign to effect entry into the mentol hospitol wherein the author of this piece is confined. But, getting out wos the trick. I.P. ossumes no responsibility for ony mental derongement thot moy result from o reoding of this effusion.

WITH reconversion plans well under way and many new theaters emerging from the blueprint stage, consideration is being given to providing automatically-compensated acoustics therein, so as to constantly afford optimum reverberation periods in auditoriums under all possible conditions of audience loading factors.

Preliminary surveys indicate that the necessary working elements can be realized best through employment of a series of grill dampers basically similar to presently used ventilation grills. One face of each of the grill louvers would be treated with adherent material of the highest possible absorptive value, with the other face as nearly 100% sound reflective as possible.

A further prime requisite is that each bank of louvers shall be equipped with modulator controls permitting adjustable rotation throughout 350 degrees of arc, or from full broadside through fully-feathered positioning. The number of grill banks specified and their placement necessarily would have to be calculated for each auditorium.

The Tempo Speeds Up

The foregoing provides the *fait accompli* of attaining the ends sought; however, the *modus operandi* contemplates certain salient features heretofore unemployed—even unexplored! It is proposed that a Fairbanks-Morse flat-bed scale be installed in each theater foyer modified as a sound absorption measurement chamber, through which each theater patron would pass. Provided with automatic sound level measurement operation, there thus would result the weighted absorption factor contributed by every individual entering the auditorium.

These determined data then would be transmitted to an I. B. M. machine records unit for integration, the composited quotient of which would provide pulses passing through a Logarithmic Amplifier to an Ignitron Power Control for application to the grill Modulator Servo units.

Reconciling Audience Vagaries

While it might be thought that the preceding alone would satisfy the requirements (and admittedly we now have arrived at a practical proposal to meet dormant demands*) there yet remain those supplementary factors necessary to reconcile smaller but vital dynamic shifts within the auditorium.** We must take into account those wholly practical and demonstrable conditions including patrons' removal of outer garments, passage of individuals to and from rest rooms, movements of male patrons to more advantageous seating position with respect to the best looking females—and vice versa*** etc., etc., once the audience is assembled within the confines of the theater.

Wherein Sanity Takes Flight

The solution for evaluation of all audience maneuvers, though seemingly complex, readily may be accomplished through the use of Radar (Mk-VIII) with helical scanning through 168 degrees azimuthal, and 71 degrees elevation range, and having a maximum time constant of 395.2 microseconds. It is considered advisable to supplement this by installation of Veeder-Root resetting counters in each aisle, at the drinking fountains and by the candy vendors, for totalization of all such traffic movements.

It is to be understood that these devices likewise shall couple into the Records Integrator, so as to provide for constant monitoring of both instantaneous and cyclical absorptive values for transmission corrections of the grill modulators.

Thus simply, the final determinant of the complex transient quiescent absorptive factor is automatically translated into practical application, since the dynamic loading is thereby reconciled to the static reverberatory characteristic of the auditorium, predetermined by usual Fourier analytical procedure!

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B. & L.'s Special Mechanism For Testing Photographic Lenses

A NEW projection method of testing photographic lenses to insure precision quality control has been developed by Bausch & Lomb Optical Co. The projector is used for final inspection of the completed lens, mounted and ready for shipment. The instrument functions like a movie projector, except that the image it throws on the screen remains stationary. The image is magnified hundreds of times, depending upon the distance of the projector from the screen and the focal length of the lens.

A target, imprinted with a series of minute replicas of a specially designed testing chart, provides the image which is projected through the lens being tested and onto a screen. Each chart is strategically placed on the target so that the entire image field, from the center to the extreme outer edges of the lens, may be examined for all types of aberrations.

Remote Control of Lens Position

Magnification is selected to meet the specific standards required of the lens. For example, a microscopic chart no bigger than the head of a pin, may be magnified 240 times for one type of lens, 300 times for another, *etc.*

By remote control, an operator standing near the screen moves the lens back and forth within the instrument, until the image is in exact focus. The minute charts, magnified hundreds of times, are sharply defined in all instances, if no aberrations are present in the lens. A second operator interchanges the lenses to be tested and checks uniformity of back focal length, another standard of quality, which is shown by a dial indicator on a micrometer scale attached to the side of the projector's front plate.

Light Source, Optical System

Heart of the projector is its light source—a 500-watt lamp and condenser system. The lamp is placed before a small, precision mirror which redirects some of the light normally lost through the optical system. A condenser lens, mounted in separate elements directly before the lamp, concentrates and intensifies the light. Aspheric surfaces to provide wide angle coverage are a feature of the condenser lens.

Targets for testing lenses of long focal lengths may be readily interchanged in a rotatable metal holder mounted before the condenser. To keep the target from becoming overheated, the lamp is encased in a ventilated housing. Also a water-cell is an integral part of the optical system.

Short Focus Condensing System

A second, or short focus, condensing system, mounted in separate elements, is used to illuminate the screen properly. Directly behind the condenser is a removable ground glass which diffuses the light for certain types of inspection. A second holder, located in front of the short focus condensing system, retains the short focus target.

The lens to be tested is placed in the front plate of the instrument, and projects the target image on the screen. A rotating support, moved by remote control to best operating position, holds the lens in place. A slow speed, 4-r.p.m. motor moves the lens back and forth along its axis, which is normal, or perpendicular, to the surface of the target. A remote control device, consisting of two switches enclosed in a small plastic case, controls the movement of the lens. Position of all component parts of the projector may be independently adjusted for maximum performance.

Wants American Cine Equipment

Cinefones, one of the largest India dealers in motion picture, radio and sound systems of all sorts is interested in purchasing in America the following equipment units: soundheads, projectors, arc lamps, amplifiers, speakers, heavy pedestals, rectifiers, stereos, curtains and controls, and all other electro-optical-mechanical accessories.

Import licenses for a substantial expenditure have already been obtained by Cinefones, whose address is 3 Queens Road, Opera House, Bombay, India.

Seeks 16-mm N. Z. Sales Agency

T. A. Fisher, Ltd., 22 Wigan St., Wellington, New Zealand, for many years have acted as distributors for many American manufacturers of visual and sound projection equipment and other electronic apparatus, invite correspondence from manufacturers of 16-mm sound projection equipment who may be interested in a New Zealand outlet. Fisher already maintains an extensive 16-mm service and repair department.

AT YOUR SERVICE

This department is devoted to the man behind the man behind the gun—the serviceman. Its prime purpose is to promote a closer relationship between projectionist and serviceman based on a better understanding of their mutual problems through an exchange of news and views, kinks and kicks. Contributions from both groups are invited.

Prolonging Life of Test Film

I HAVE noticed that the ends of test film become worn out before the rest of the film. This is usually due to the fact that the small hub of the test film places too much tension on the film, even in the upper magazine. Then occasionally the reel may "hunt" in the upper magazine causing serious damage to the test film.

This trouble can be eliminated by filling the reel with about two inches of old worn or obsolete film and using this instead of a large hub type reel. Since it is not possible to secure small reels with large hubs that fit in a carrying container, the procedure suggested saves time of rewinding the film on a standard reel and also protects the film.—C. H. Atchisson, *RCA*.

Correcting Noise on PG-134

A noise condition that took some time to locate was caused by paint under the screwhead holding the PEC housing, insulating it from ground. The paint should be removed from under all screwheads or any place where two pieces are bolted together. This also includes the cover of the PEC input network.—C. H. Atchisson, *RCA*.

Unit for Tools and Parts

I have found it quite helpful in keeping my carrying case neater by using money bags for small tools, capacitors, resistors, screws, etc. Use a separate bag for each item.—J. P. Reiger, *RCA*.

Correcting Speaker Trouble in 16-MM Sound System

The incident described herein may help guide other field men who may encounter a similar tricky problem in theatre or industrial work. This particular incident occurred in the home of one of my friends who had trouble with a 16-mm sound system using a 3-wire speaker line.

Relative to the preceding, a 3-wire braided and unshielded line about 30 feet long was used between projector and loudspeaker. Most of this run was lying on a fairly damp cement floor. Amplifier volume control, set to full position, resulted in barely audible sound from the speaker.

The trouble was traced to the 3-wire line in which leakage and self-generation of direct current existed. Due to chemical action the 30-foot length of line, disconnected at both ends, generated an emf of 2 volts D.C. between one wire and either of the other two wires. I tested an 8-foot sample which seemed particularly damp and got a voltage reading of 0.5 V. at 0.005 A.—R. H. Bisbee, *RCA*.

Flutter on Soundheads

Garbled voice reproduction and flutter has been traced to anti-rust grease drying up and accumulating on the rotary stabilizer bearings. This grease looks like soap and in some cases is so brittle that one has to crack it up before it can be removed. Carbona can be used to remove the accumulated grease. Where cleaning does not correct this condition, new bearings should be installed.—Alfred Kunze, *RCA*.

'Warble' Frequencies

A HONEY of a pre-amp on the new Century systems. Uses 6AK5 miniatures: one as a triode, other as cathode follower. Yes you can hear "what's cooking" right at the machine. Nice film drive past scanning point, too.

There seems to be a tendency to eliminate the push-pull feature from sound heads. Is there any need for push-pull take off? Come to think about it, in all these years we have encountered only one feature that was released with standard track prints and with special prints having push-pull tracks.

Sure we frequently replace push-pull cells with standards to get the extra gain. Can always use it to good advantage. Yes sir, we like a good healthy signal from the cell. It helps the ratio. Good illumination helps the "picture". It will help the sound too, if you can get it on the track and onto the cell.

Nice new test equipment being sported by the RCA boys (lucky dogs).

Which reminds us, lens repairs are very slow these days. Yes, siree, equipment sure stays "tight". Our private crystal ball is of the opinion that it will remain so for a long, long time.—Veritas.

Switching Over on Simplex Dual Amplifier System

Projectionists should be advised to shut off A.C. to both amplifiers when switching from one amplifier to the other, where the AM-2013 switch is used in dual amplifier systems. After the switches are in use for awhile they start to arc over and in some cases are damaged. Switching off the A.C. will eliminate this trouble.—Alfred Kunze, *RCA*.

Warren Conner, Altecman, Dies

Warren Conner, 56, District Manager for Altec at Cincinnati since 1940, died suddenly on February 28. Conner joined ERPI as an installation engineer early in 1928, after being with Western Electric in Philadelphia for a number of years. While with ERPI he travelled extensively both as an installation engineer and as a sales representative. In 1937 he was named Branch Manager of ERPI at Philadelphia and retained that same position when Altec was formed later that same year. In 1940 he was made District Manager at Cincinnati when Altec set up this office. Conner was well-known throughout the industry and his passing will be felt by his associates as well as a host of acquaintances in the motion picture field. He is survived by his wife, Bertha.

Get your copy of

Projectionists'

SERVICE MANUAL

and learn what the service man does when the equipment fails to function properly. Compiled in handy book form and attractively presented.

Presenting: George W. Murphy



NO RELATION to the Hollywood actor of the same name but self-admittedly just as handsome, maybe more so, is the estimable George W. Murphy who hails from that town the name of which invites mispronunciation—Boise, Idaho. Always a died-in-the-wool Northwesterner, Murph was born in 1895 in what was then Utah Territory.

The kid chore of distributing handbills for the local opera house in Weiser, Idaho, was Murph's first contact with the theatre. In 1910 one George Moyer opened a "store" motion picture house in Weiser, the then "last-word" Edison projector being tended to by a Mr. Hoffman. This Edison product held Murph spellbound, so he was naturally lolling about on the fateful evening when Hoffman failed to show up.

Murphy went to school in the daytime and ministered to his beloved Edison mechanism evenings. It was a one-and-one-half "show" in that all the film was shown once and then as much more as could be run within the inexorable time limit. When closing time came, "bang" went the show at whatever point it happened to be at the moment. The "theatre" offered the inevitable piano and drums as musical accompaniment for the film.

The Celtic Influence

The Murphy family moved to Oregon, thus cutting short the show business career of its juvenile paragon for about three years. Then a Nate Leigh hired the 20-year-old Murph to tour a one-night circuit in several nearby towns. Projector bases and mechanisms were spotted in each town, while the heads and film program were toted about the circuit. This chore lasted two years, testing to the limit the young projectionist's versatility and ability to improvise.

Then back to Idaho (Nampa) went George W. to join the Majestic Amusement Co. No sense of majesty possessed George, however, for he admits being fired for "getting lippy" (the name *is* Murphy). Then to the Idaho Power Co. for 18 months until he was tapped by Uncle Sam for service in France. Celtic that he is, Murph wangled a job as Army projectionist following the armistice, serving at Bordeaux until May, 1919.

George joined I. A. Local 91 in Boise on June 6, 1920, his Labor activities since having encompassed every office in his own Local, delegate to I. A. conventions, State Federation Labor, and local Trades and Labor Council. He also belongs to the Elks, the V. F. W., and the American Legion.

Murph has two sons, only one of which he has inoculated with show virus as a junior member of Local 91. Murph is a bit "tetched in the haid" about his 16-mm photography hobby, and one has only to mention the word "Coolidge" in front of Murph to have him verging on the edge of insanity. Even an oblique reference to "worm fishermen" induces symptoms of dementia in one whose own true love is dry-fly angling.

These biographical notes on Murph testify to the fact that wherever located—Boise, Broadway, or Bakersfield—these veteran projection mugs all weave a strangely similar pattern.

New RCA Video Receivers Chart 1947 Design Patterns

A new-line folder on RCA television receivers in which the four initial models are described and illustrated in detail is now available. The four models thus described are:

630TS—A table model, sight-and-sound television receiver presenting a 52-square-inch picture of such brilliance that it can be viewed with ease in daylight or a normally lighted room. This set has 26 tubes plus three rectifier tubes and a picture tube. Its dimensions are 14½ in. high, 26 wide, and 19 deep. Walnut finish.

621TS—A table model, sight-and-sound receiver, presenting a picture 23 inches square. Made in walnut, mahogany or blonde mahogany finish, this set contains 18 tubes, 2 rectifier tubes and a picture tube. Its dimensions are 15¼ inches high, 19 wide, and 16¼ deep.

641TV—A console receiver also featuring FM and AM radio and a Victrola with automatic record changer and ample record storage space. Picture area is 52 square inches. It is finished in either walnut or mahogany. The set contains 36 electron tubes, 4 rectifier tubes, and a picture tube. Dimensions are 46 inches high, 33¼ wide, and 21½ deep.

648PTK—A large-screen receiver presenting a picture 300 square inches in size, approximately the size of a standard newspaper page. Its picture enlarging system makes it possible to present a 15 x 20 inch picture in a cabinet whose dimensions are only 47½ inches high, 36¼ wide, and 22¾ deep. In addition to television, the set also features FM, AM, and short-wave radio reception. The set contains 40 electron tubes, 7 rectifier tubes, and a picture tube. Walnut finish.

'Footcandle' Unit of Measurement

Intensity of illumination on a surface is measured in terms of the footcandle. Imagine a light source and a surface perpendicular to a line drawn from it to the light-source. At a distance of one foot from a light-source of one candlepower the level of illumination is one footcandle. At 10 feet from a source of 100 candlepower the illumination is 1 footcandle. Intensity of illumination generally varies inversely as the square of the distance from the source of light. This fact is commonly ignored by users of light and eyes.



REFLECTING THE HIGH-STANDARD PROJECTION ROOMS IN BRITISH CHAIN

Matching in every particular the best American jobs is this projection room in the Gaumont Theatre, Wiltshire, England. Attesting to fine maintenance, this photo was taken five years after theatre opened. Equipment includes Brenkert Enarcs and Gaumont projectors. R. Pulman, chief engineer for Gaumont-British, has a right to be proud of this fine job.

IN THE SPOTLIGHT

(*Continued from page* 21)

vice-president, along with other representatives of A. F. of L. unions, is a signer of the petition asking for the investigation.

● According to statistics issued by the U. S. Department of Labor, the dollar is now worth 69c.

● Another old-timer has passed on. G. C. (Pat) Oakes, Sr., member of Houston Local 279 for 23 years, died several weeks ago from a heart ailment. He had been in failing health for several years, and at the time of his death had been on a leave of absence from his job. The entire executive board of Local 279 accompanied the body to Waco where it was buried with Masonic funeral rites. Pat is survived by his wife, a son, Pat, Jr., and one grandson.

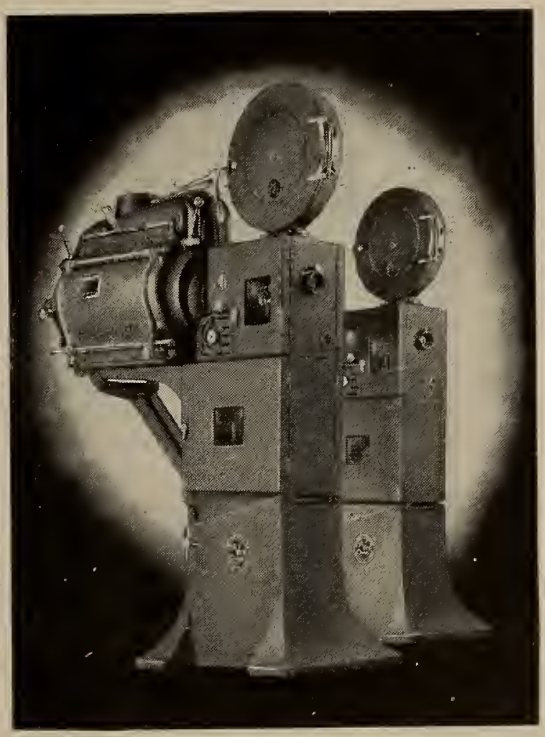
25 Years Ago—March 1922

● The One Big Union movement hit Colorado with criticism being tossed at A. F. of L. . . . Musicians Local 310 (N. Y. City) outlawed by Joe Weber, head of the American Federation of Musicians, tried unsuccessfully to restrain the newly organized Local 802. . . . Wayne Wheeler, counsel for the Anti-Saloon League, issued a hot blast against organized labor for favoring the legalized sale of light wines and beers. . . . Sam Gompers urged Actors Equity to reorganize the British Actors Association in England and thus prevent American managers from importing to this country non-union and low-priced actors. . . . L. D. Bohnett, a prominent attorney of San Jose, Calif., decried the use of the term "American" by anti-unionists. "An aroused public opinion," declared Bohnett, "should demand that the term 'Amercan' shall not be dragged through the mire of class or factional controversy." . . . Organized labor in Massachusetts opposed to proposed Industrial Relations Court. . . . The Clayton Bill, which broadened the powers of the Moving Picture Commission to investigate the books of film companies, passed the New York Assembly. . . . Theatrical managers of Montreal, Canada, protested the Daylight Saving Law. . . . Broadway producers vigorously opposed to voluntary censorship of stage productions. . . . Shubert Vaudeville Circuit now cut to eleven weeks. . . . Managers in Paris, France, threaten to close theatres in fight against burdensome taxes. . . . Will Hays, the film czar, was tendered a dinner at the Hotel Astor, New York City, which was attended by officers of the I. A. . . . Bill Haywood, head of the I. W. W., who fled this country forfeiting $65,000 bail, working for the Soviet Government in organizing the Ural mining district. . . . Coal strike set for April 1. . . . The I. A. General Executive Board announced that the 26th Convention would be held in Cincinnati, Ohio. . . . Ralph Behling was secretary of the 4th District. . . . The Saenger Amusement Company, operating 62 theatres throughout the South, declared a 10% dividend to its stockholders. . . . John Emerson, president of Actors Equity, sailed for Europe to look into picture industry in Germany, France and Italy.

B. & L.'s Expansion Program

Opening of a new manufacturing plant at Wellsville, N. Y., and arrangements to purchase the modern, four-story Navy Building on Champeney Terrace in Rochester, have been announced by Bausch & Lomb Optical Co. as part of the firm's $6,000,000 plant expansion and equipment modernization program. Hundreds of thousands of dollars worth of new and improved optical machinery has been purchased. In addition, many new manufacturing processes have been developed and installed to help meet mounting demands.

In addition to the expansion and equipment modernization program, B. & L.'s research and development expenditures are at an all-time high and strides are being made in the development of new glass making techniques, production of coated lenses, television optics and plastics.



TWINS *to* COUNT ON...

To Get the Most from Hollywood's Best

To reproduce Hollywood's finest photography and sound at its glamorous best demands mastery in projection comparable with the photography and recording utilized in its filming.

New DeVRY precision performance twins enable you to reproduce Hollywood's masterpieces in black-and-white or technicolor on your screen the way your audiences want them — faithful to tone and color, camera composition and sound.

Because new DeVRY 35mm. Motion Picture Projectors are the best that warborn engineering know-how, technical knowledge and skilled craftsmanship can produce, they are the most economical projection booth equipment available. Before you buy, mail the coupon to DeVRY.

* * *

Their war job of training and entertaining completed with flying honors, DeVRY "G.I." projectors are again available to the world's finest theaters.

5 TIME WINNER

DeVRY alone has been awarded five consecutive Army - Navy "E's" for Excellence in the production of Motion Picture Sound Equipment.

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Please send details about the NEW DeVRY 35mm Theater Projectors and Sound Systems.

Name .....

Address .....

City ..... State .....

Theater ..... Capacity .....

MAGNETIC RECORDING SESSION

(Continued from page 9)

full power output. These figures are quoted to show that distortions in film recording and film reproducing equipment are now in the order of 5 to 8%.

Although these figures are given in terms of total harmonic distortion, the industry uses intermodulation and cross-modulation tests for determining distortion. The Committee is now correlating this information and expects to have available in the near future, maximum allowable distortion in percentage intermodulation and cross-modulation.

Although distortion measurements are used to check and maintain equipment, listening tests are the final criterion in determining quality.

Other Technical Requisites

(7) *Flutter.* — A magnetic recorder should have a flutter content of not more than ± 1/10 of 1% based on the operation of present film recording equipment.

(8) *Slating.*—The recording medium should be capable of accepting visual marks for identifying and synchronizing purposes.

(9) *Edge and Code Numbers.*—Edge numbers, placed on negative film by the manufacturer, are visible on raw stock and print through onto the print. These numbers are used for identification purposes on both picture and sound negative until the picture and sound release negatives have been finally assembled. It would be a great convenience if the recording medium were capable of accepting such numbers for purposes of identification.

Code numbers are numbers which are added to the separate picture and sound work prints for purposes of easy synchronizing and identification in the studio. These numbers are in addition to negative edge numbers and run consecutively through each reel, identifying both the reel and the sequence in the print as assembled. Code numbers are used throughout the editorial procedure. Here again, it would be of great convenience to be able to code the recording medium. This could be accomplished if the recording medium were capable of taking ink.

(10) *Duplication.* — For protection, editorial, and other purposes, duplication (through rerecording) should be available with no greater loss from the original to the duplicate than now obtained in film from the negative to the print.

(11) *Durability.*—The recording medium must be as durable as film, from handling, projection, and storage standpoints. Prints are projected from 50 to 500 times.

(12) *Perforations.* — The ability to perforate the recording medium for editorial and synchronizing purposes would be advantageous. 35-mm perforations on a single side of the recording medium would pobably be satisfactory for studio use.

Splicing, Safety Base, Volume

(13) *Splicing and Blooping.*—Quick and accurate splicing would be an advantage for editorial purposes and it must be possible to "bloop" all splices.

(14) *Shock Resistance.* — The magnetic recorder must be capable of withstanding normal handling in all types of transportation. Ordinary shock and vibration during such transportation should not affect the operation of the modulator.

(15) *Safety Base.*—The base carrying the recording medium and the recording medium itself should burn at a rate comparable to acetate film and not nitrate film.

(16) *Volume Compression and Expansion.*—Volume compression and expansion might be given consideration for future use.

(17) *Push-Pull Sound Tracks.*—Push-pull sound tracks are not necessary if



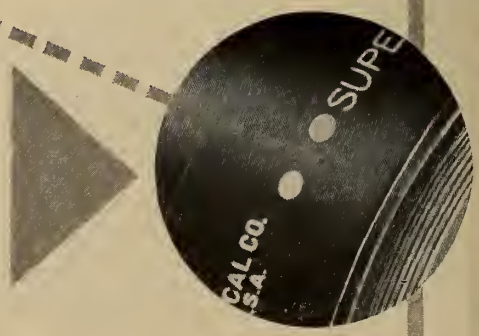
Super Cinephor's Two "Mint Marks"

Bring Money to Your Box Office

● Two, tiny, colored dots on Super Cinephor lenses mean the finest in motion picture projection . . . better definition, contrast, more shadow detail, greater purity of color, and long-lived high efficiency . . . more box office appeal.

PURPLE DOT means that Super Cinephor lens surfaces have been Balcoted, which cuts to a minimum light loss due to reflection from air-to-glass surfaces, increases light transmission 30%.

YELLOW DOT means that Super Cinephor lens elements have been cemented by a special heat-resisting, permanently clear, synthetic thermosetting cement, perfected by B&L. This cement withstands the high heat of the arc without fracturing, blistering, or crystallizing.



BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.

satisfactory quality can be obtained without their use.

It was pointed out that it would be the responsibility of the manufacturer to indemnify, patentwise, the equipment for the studios. Also, that while important savings can be effected by a reduction in the cost of recording medium, more important savings can result from equipment which saves production time.

At a subsequent meeting of the Research Council Basic Sound Committee the foregoing conclusions were reviewed and affirmed, and the following addenda were approved.

(*a*) That the recording time should be at least 11 min of continuous recording,

(*b*) That the rewind time should be less than the recording time and it would be very desirable to have a rewind time of one minute,

(*c*) That it would be very desirable to have an operating time such that the recording medium has acquired constant speed ready for recording in three seconds from the time the recording motors are operated,

(*d*) That the width of the recording medium should be one of the following: 35-mm, 17½-mm, 16-mm, or 8-mm.

A New Paper Tape Magnetic Recorder

EXPANDING the number of different types of recorders currently available, a new paper tape for sound recording in which the material receiving the magnetic impressions is a metallic base powder painted on the tape, rather than an oxide, has been developed. It permits recording at a fairly slow tape speed, as its magnetic properties approach those of Alnico III.

The development is due to Hugh A. Howell, Research Engineer for The Indiana Steel Products Co.*, and has been incorporated into commercial recorders for use with home radios or separate amplifiers.

Christened Hyflux, the magnetic properties of the tape material apparently are due to the process of its preparation as much as to its composition. Its high coercive force requires a considerably different technic for recording and erasing however, than that used with wire and lower coercive force materials. The net result is a simpler recording mechanism and more assured permanency of the tape.

Hyflux Recording Advantages

The recording advantages of Hyflux tape are attained by coordinating its inherent magnetic capacity with the specially designed recording head and associated circuits which utilize its high coercive force to maintan a high signal-to-noise ratio.

By using higher tape speeds, very high fidelity can be reached at extreme frequencies which would include the third harmonics. This, however, is not considered the normal operational range because of the sacrifice in recording time entailed. The frequencies generally used for music are from 100 to 5,000 cycles.

At present Hyflux will operate satisfactorily for most recording purposes at frequencies up to 6,000 cycles with a tape speed of 8 inches per second. While further development may permit a wider frequency range or lower tape speed, this is considered adequate for home and commercial needs.

New Recorder Design

The advantages of using a paper tape are numerous. It can be reeled more easily, can be mended with scotch tape and easily edited, can be marked with pencil on the paper side for reference purposes, and is just as strong as fine wire. In addition, the paper provides space separation between magnetic impressions on adjacent turns on the reel.

(*Continued on following page*)

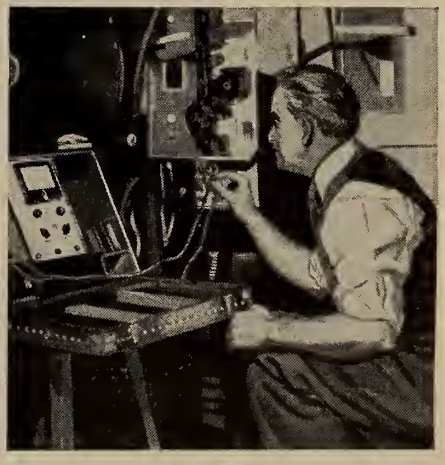
* 6 No. Michigan Ave., Chicago, Ill.



These grim faces may be your patrons, glaring at your booth—



And this you, when bad-sound refunds wreck a smash-hit run.



RCA Service helps prevent such breakdowns—keeps your sound clear and strong



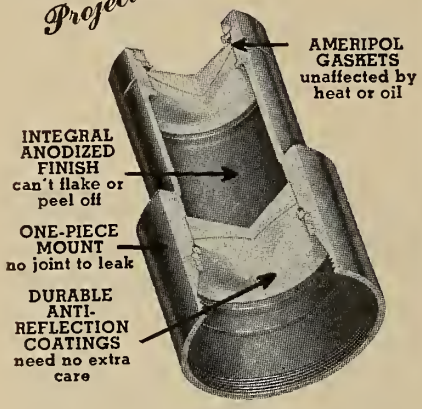
—your box-office traffic healthy and going the right way.

Smash the Sound-Trouble Bugaboo!

When you buy RCA Service, your sound gets regular check-ups by a skilled technician, with modern instruments to put the finger on danger spots. Your sound and projection get all parts needed for tip-top operation. You get prompt help in an emergency. Stop worrying that sound troubles will hit you where they really hurt. Join the thousands who find RCA Service smashes the sound trouble bugaboo. It will cost you but a few admissions per day.

RCA SERVICE COMPANY, INC.
RADIO CORPORATION of AMERICA
CAMDEN, N.J.

LOOK inside a SNAPLITE...
See Why it's The Projection Lens of Quality



All Aluminum Construction

Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

• • •

Trouble-free performance is assured by the hermetically sealed construction of the Series II Snaplite. Its sleek black beauty typifies finer functional design—for the black anodized treatment, inside and out, is an integral part of the aluminum mount... it can't flake, chip, or peel off!

Enduring top performance is assured by the hermetically sealed mount, which excludes oil and moisture, and eliminates need for disassembly. Cleaning time is cut to a fraction—handling is minimized—danger of damage is sharply reduced. Light-weight aluminum mount cuts vibration to a minimum.

Brilliant pictures result from speed of f/2.0 in focal lengths from 3½" through 5". All optical surfaces are treated with durable anti-reflection coatings for still greater brilliance and contrast.



KOLLMORGEN Optical CORPORATION
2 Franklin Avenue
Brooklyn 11, New York

RCA's New 1-kw Radarc Lamp by Brenkert

A completely new one-kilowatt high-intensity projection arc lamp, for use in small and medium theatres with capacities up to 800 seats, is now in peak production at RCA's Brenkert plant in Detroit. Known as the Brenkert Radarc Lamp, it is not a modified low-intensity type lamp but was especially designed for high-intensity operation in the one-kilowatt power range and is adaptable for installation with all standard 35-mm projectors.

The Brenkert Radarc Lamp will operate equally well with motor generators, copper-oxide rectifiers, single- or three-phase tube type rectifiers, and with either double- or single-shutter projectors without any alterations of the projector. It is simple in operation, easy to service, and attractive in appearance.

Only one control is necessary for adjusting the speed of the automatic carbon feed which is controlled by a non-slipping ratchet and pawl to insure smooth and accurate operation. Carbon position can easily be adjusted by means of feed control knobs located on both the positive and negative carbon jaw assemblies. The negative carbon can be adjusted both laterally and vertically to insure perfect alignment with the positive crater. Carbon jaws are made of a new-type metal highly resistant to heat and operate easily to facilitate installation and removal of carbons.

Improved Housing, Ventilation

The lamp housing, a radical departure from older equipments of this type, is streamlined, functional in design, and finished in black wrinkle. Concealed hinges on the doors enhance the smooth, streamlined effect. A wide door on each side of the housing makes it easy to reach all parts for servicing and replacements. A combined ventilation control and chimney provide the correct draft of air through the lamphouse to carry off gases and carbon dust and insure stable operation.

A lens system is provided to produce a large, bright image of the arc on an arc vision screen which can easily be seen by the projectionist. The large mirror provided to reflect the maximum amount of light to the projector aperture can be easily and quickly removed.

Though of comparatively small size and low power consumption, the new lamp is comparable in quality and dependability to the widely known Brenkert Enarc lamp, which is used in many large theatres throughout the country. The snow-white light produced by the Radarc is brilliant enough for projection on screens up to 18 feet in width. Overall dimensions of the Radarc lamp are: 34¾ inches long, 17¼ deep and 20 high. The chimney takes a pipe 6 inches in diameter.

MAGNETIC RECORDER

(*Continued from preceding page*)

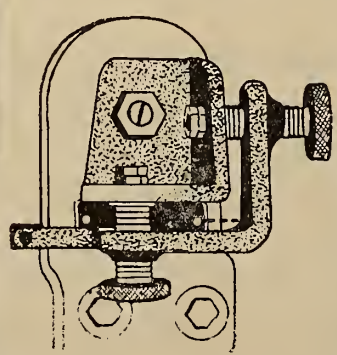
This is claimed to reduce cross magnetization during extended storage.

Due to its high coercive force, Hyflux could not be used efficiently in existing tape recorders. Hence a new recorder has ben built for its use in a flat or "drawer" model to go under a table radio. This utilizes the radio's amplifier directly or includes first a simple low gain preamplification. A half hour program can be recorded on a 7-inch standard 8-mm film reel.

The technical specifications of Hyflux tape are: Composition—metallic powder coated on paper tape; tape dimensions—width ¼ in.; thickness—0.002 in. (including coating thickness of 0.0005 in.); break load of tape—6 lb.; excellent dimensional stability due to choice of paper base; superior to any plastic ribbon available at this time.

NEW RCA SALES OFFICE IN K. C.

A new RCA district sales office in Kansas City, Mo., has been added to the field organization of the Engineering Products Dept. The office, directed by C. M. Lewis, is at 221 W. 18th Street. Dave Bain, Broadcast Sales, and Don Davis, Theatre Equipment, cover the Kansas City, Denver, Omaha, and St. Louis areas.



Huff's NEGATIVE CARBON ALIGNER for the PEERLESS MAGNARC LAMP

• Huff's Negative Carbon Aligner installed on your Magnarc lamp will cut carbon consumption • To operate—simply use the two adjusting screws to raise or lower, or move the carbons sideways • Pays for itself with savings and results.

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TRADE UNIONS IN AMERICA

(*Continued from page* 16)

and officers understood what it was all about.

This much the craft unions of the three great periods have had in common: they have provided for thorough apprenticeship training, they have made practical use of collective bargaining, they have refused to work with non-members and, finally, they have made use of a most powerful weapon of defense and offense, the collective stoppage of work, "downing tools."

In still another way there was a similar development during the three periods. The organizing of labor parties is a modern development, but the organized workers of the past periods were active in political affairs, in the election of public representatives and officials. They played a part even in the Roman Senate, a most prominent one when they would rebuke Senators by "downing tools" and marching outside the city walls, while the Senate considered whether it would continue to stand on its dignity while going without the services of the crafts.

Medieval Craft Guilds

During the Dark Ages which followed the collapse of Roman civilization, Europe turned backward toward barbarism. Gone was the purposeful, constructive strength of the Empire, with the leadership which had made it great.

The cities were largely deserted; there was no way of supplying them with food had they been populated. The production and distribution of wealth had practically ceased. The courts of law and the schools had ceased to function. Destruction, fear and lawlessness had taken their place. The law of the fang and the claw, with its savagery, replaced orderly government. Such authority as existed was in the hands of strong and brutal men who had secured local control and maintained it through armed force.

Industry and commerce languished or vanished. The craft unions were without employment. They expired. The end of over a thousand years of craft unionism had been reached. The only records left of their existence were the inscriptions they had carved upon the stones of a vanished civilization, and the scanty references in the writings of antiquity.

They had taught and applied the narrow truth of the brotherhood of the skilled who toiled. Before the end came, many had been influenced by the greater Divine truth taught by the Carpenter of Nazareth—the fatherhood of God and the brotherhood of man.

Christianity also suffered from the Empire's collapse. The church was weak, its influence extending but a short distance from those places where the teachings of the Carpenter of Nazareth were taught and practiced. The flame of civilization and of Christianity flickered feebly in the churches and monasteries. It almost became extinguished.

After several hundred years vestiges of civilization reappeared. Though there was little security for life and property, there developed a slowly increasing demand for fabricated goods. Little by little and laboriously men taught themselves the skills which had been lost and which were now required. Craftsmanship reappeared on the industrial horizon.

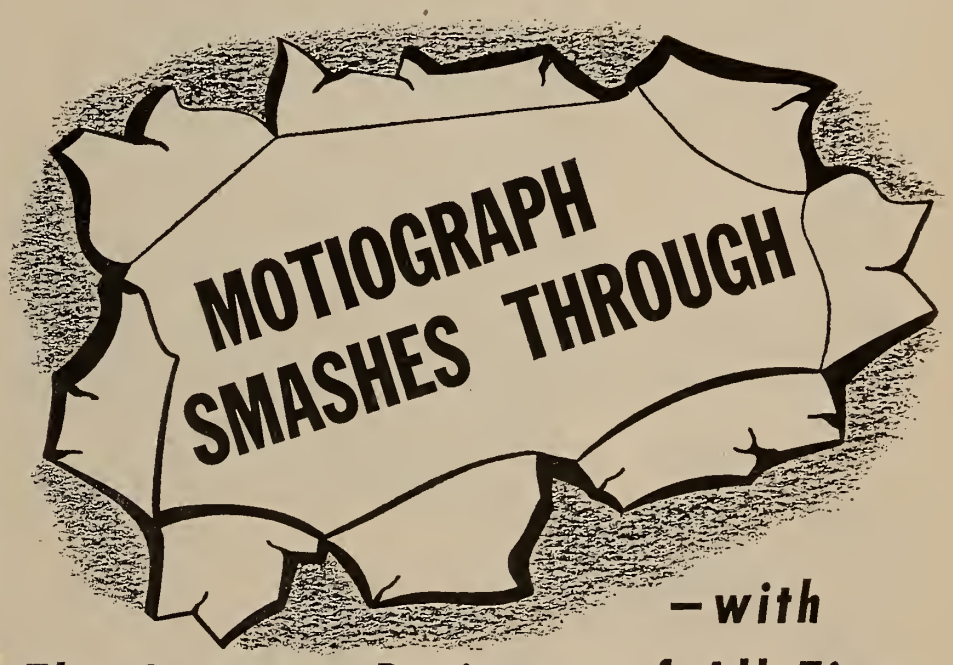
10th Century Craft Advance

This industrial revival was accompanied by the organizing of the skilled workmen into craft guilds, not because someone had prepared a blueprint for them, or that they possessed records of the past, but for the same practical reason which had led the workmen of ancient Greece and Rome to organize—the impelling force of self-preservation.

Beginning with the tenth century the craft guilds spread throughout much of Europe. As time passed they, too, became the active champions of free institutions and self-government. In time many of them secured royal charters which gave them special protection and privileges. Rulers and city corporations did not like the power they had acquired, but did urgently require the skilled work they alone could perform.

Merchant guilds developed, and these also looked askance at the strength the craft guilds had established. But the skill possessed by the guild members

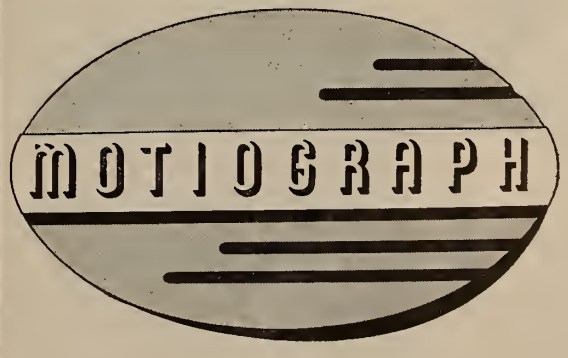
(*Continued on following page*)



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The Greatest Projector of All Times

THE COMPLETELY NEW



"A A"

It sets a new standard in screen performance!

Its design and construction assures long life with minimum upkeep.

MOTIOGRAPH, INC.
4431 W. Lake St. Chicago 24, Ill.

EXPORT DEPARTMENT:
J. E. Robin, Inc.
330 W. 42nd St., New York, N. Y.

DeForest's 'Audion' 40 Years Old

January, 1947, marked the 40th anniversary of the invention of the three-element "audion" by Dr. Lee deForest. Actually, it was during December, 1906, that the first triode was produced and tested, but the famous patent application was not filed until January 29, 1907.

The five-week delay resulted from "Doc's" characteristic generosity of heart, explains a close associate who at that time decided to get married. "Doc" had promised the young couple he would "show them New York," and they landed in town just as deForest and his attorney had completed the triode's patent specs. Although the inventor had only enough cash on hand for the Patent Office fee, he gathered up the honeymooners and started out on a round of celebrating.

Available cash was soon used up and deForest had to wait five weeks more before he got funds for the patenting of a device which revolutionized communications and signalled the dawn of the electronic age.

NEW 5-TO-1 PROJECTOR FOR AC-DC OPERATION AT S.M.P.E. MEETING

A new 35-mm professional theatre projector which utilizes a 5-to-1 intermittent movement of the old Powers type and which, by means of special gearing, can operate on either A. C. or D. C., will be demonstrated at the forthcoming S. M. P. E. Convention in Chicago, April 21-25. Sponsors of this new mechanism—Manufacturers Machine & Tool Co., Inc., 320 Washington St., Mt. Vernon, N. Y.—assert that the new unit, although delivering greatly increased screen illumination, affords flickerless projection even when operating on A. C.

Two complete heads will be demonstrated, one assembled and the other broken down into its component parts, and technicians will be present to answer any questions relating thereto.

TRADE UNIONS IN AMERICA

(*Continued from preceding page*)

was so all-important that they proved successful in holding their own and in playing an active part in municipal affairs. At one period the craftsmen was considered the most important man except the noble.

An illuminating illustration of their standing is contained in the "Red Book of Hergest," a fourteenth century Welsh Bardic manuscript. It contains the story of "K'lhweh and Olewen," King Arthur being the principal character. The following dialogue occurs:

"Open the Door."

"I will not open it."

"Wherefore not?"

"The knife is in the meat, and the drink is in the horn, and there is revelry in Arthur's Hall, and none may enter therein but the son of a king of a privileged country, *or a craftsman bringing his craft.*" |(Author's italics.)

From the eleventh to the fourteenth century the craft guilds grew in number and in influence. Then a gradual change in the journeyman craftsman's status began to develop. Industry was expanding. Master craftsmen began to employ several journeymen and apprentices. The masters desired more control over the journeymen. They slowly secured this because they were employers and also through gradual changes in the guilds' constitutions and by-laws, which prevented journeymen from holding certain important offices in the guild, including that of treasurer.

(To be Continued)

NOW NEW BRENKERTS, DeVRYS, MOTIOGRAPHS ARE FACTORY EQUIPPED WITH "ZIPPERS"

Convincing proof of the equipment manufacturer's changeover preference, is the selection of Strong "*Zipper*" Changeovers as *standard factory equipment* on new "AA" MOTIOGRAPH, new postwar DeVRY, and the new BRENKERT theater projectors. Strong "*Zipper*" Changeovers are available in three models: Strong *Special* (for porthole installation), Strong *Zipper* for sight alone or sound alone, and Strong *Dual-Purpose Zipper* for both *sight and sound.* Essannay Electric Manufacturing Co., 1438 N. Clark, Chicago 10.

STRONG'S *Zipper* CHANGEOVERS

AN ESSANNAY ELECTRIC MANUFACTURING PRODUCT

PUT MORE LIGHT ON YOUR SCREEN

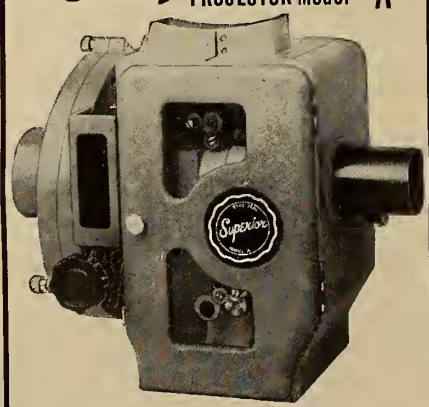
Install new National REFLECTORS

● All reflectors gradually deteriorate to a state where replacement cost is insignificant. A drop of only 10% in reflective efficiency results in a corresponding decrease in screen brilliancy, and represents a loss amounting to 10% of the cost of your current and carbons. Replace yours now, and regularly. Available for all types and makes of arc lamps.

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

"There's a Branch Near You"

NOW IN PRODUCTION!
The NEW *Superior* PROJECTOR Model "A"



- Double Bearing Intermittent.
- New Rear Shutter.
- Steel and Phenolic Gears.
- Hardened and Ground Shafts.
- Mount for New F.2 Lenses.
- Fits Standard Base and Drives.

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Sound Reproducing System Amplification Definitions

II.

Herewith the second and concluding installment of sound reproducing terms as compiled by the Tube Department, RCA, with due acknowledgement of the fact that many of the definitions are based on standards established by the Institute of Radio Engineers. Familiarity with these terms will enable projectionists to better understand the operation of sound-film and video equipments.

Electrode Current is the current passing to or from an electrode through the vacuous space.

Electrode Dissipation is the power dissipated in the form of heat by an electrode as a result of electron and/or ion bombardment.

Electrode Voltage is the voltage between an electrode and a specified point on the cathode.

Electron Emission: The liberation of electrons from an electrode into the surrounding space. In a vacuum tube it is the rate at which the electrons are emitted from a cathode. This is ordinarily measured as the current carried by the electrons under the influence of a voltage sufficient to draw away all the electrons.

Electron Tube: A vacuum tube evacuated to such a degree that its electrical characteristics are due essentially to electron emission.

Emission Characteristic: A graph plotted between a factor controlling the emission (such as the temperature, voltage, or current of the cathode) as abscissas, and the emission from the cathode as ordinates.

Filament: A cathode in which the heat is supplied by current passing through the cathode.

Full-Wave Rectifier: A double-unit rectifier arranged so that current is allowed to pass in the same direction to the load circuit during each half-cycle of the alternating-current supply, one element functioning during one half-cycle and the other during the next half-cycle, and so on.

Gas Amplification Factor of a phototube is the factor of increase in the sensitivity of a gas phototube due solely to the ionization of the contained gas.

Gas Phototube: A type of phototube in which a quantity of gas has been introduced, usually for the purpose of increasing its sensitivity.

Grid: An electrode having openings through which electrons or ions may pass.

Grid Bias: The direct component of the grid voltage.

Grid Capacitor: A series capacitor in the grid or control circuit of a vacuum tube.

Grid Driving Power is the average product of the instantaneous value of the grid current and of the alternating component of the grid voltage over a complete cycle. This comprises the power supplied to the biasing device and to the grid.

Grid Leak: A resistor in a grid circuit, through which the grid current flows, to affect or determine a grid bias.

Grid-Plate Transconductance: The name for the plate current to grid voltage transconductance. (This has also been called mutual conductance.)

Half-Wave Rectifier: A rectifier which changes alternating current into pulsating current, utilizing only one-half of each cycle.

Heater: An electrical heating element for supplying heat to an indirectly heated cathode.

Heterodyne Reception: The process of receiving radio waves by combining

(Continued on page 35)

FOREST
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A new and highly acclaimed development—ELECTRONIC CONTROL—makes present mechanical systems of feeding the pasitive and negative carbons in projection arc lamps old-fashioned and absolete; assures faultless arc control of precisian accuracy, maintaining the proper facal point necessary far praducing maximum light intensity without the necessity of constant watching and adjusting. Eliminates cams, gears, clutches and associated gadgets.

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New Victor 16-mm Sound Projector, Model 60, Available Now

A NEW 16-mm portable sound projector, the Model 60, has been announced by Victor Animatograph Corp., Davenport, Iowa. The projector, housed in streamlined, aluminum cases, contains many design improvements. It is a multiple-purpose unit for use with either sound or silent film and includes jacks for use with a record player or as a P. A. system. It includes reverse operation and has the advantage of still-picture projection.

Among the new features is the Instantilt, a device which centers the picture on the screen at the touch of a finger. Replacing the conventional knurled knob, this unique improvement utilizes a counterbalance which causes the front of the projector to rise merely by "pinching" a conveniently-placed lever. Another improvement is the Duotrol which, providing separate controls for both bass and treble tones, permits emphasizing of high and low frequencies independently of each other, thus producing full harmonic value of sound.

The new clutch-controlled rewind permits fast, safe, convenient rewinding of film without the need for shifting belts or reels. A new leveling device compensates for uneven projection surfaces.

Other Time-Tested Features

The exclusive safety film trip, 180-degree swing-out lens mount, exclusive framing screw adjustment, spira-draft lamphouse and duo-flexo pawls, all time-tested Victor features, are included on the Model 60. The use of either 750- or 1000-watt projection lamps is optional. The optical system is straight-lined, permanently aligned at the factory and includes a coated 2-inch, F: 1.6 lens as standard equipment. Other lenses up to 4 inches are instantly replaceable. The top-mounted reel arms accommodate 2000-foot reels. The speaker case contains a locked spindle mount with a capacity for two spare reels.

The sound system contains a stationary sound drum with a micrometrically-set sound lens. It provides equally sharp response from regular or reverse prints, black-and-white or color. The exciter lamp is rated at 100-hour life instead of the customary 50.



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PERSONAL NOTES

HARRY E. LEROY, who started with RCA in 1923 as a 60-cent-an-hour electrician, has been named Director of Manufacturing for the RCA Victor Division, in which position he will coordinate and direct manufacturing activities of the company's ten plants throughout the country.

ARTHUR MALCARNEY, formerly plant manager of the RCA parts department, was named to succeed LEROY as general plant manager of the Engineering Products Division.

* * *

BEN A. RAMAKER and I. L. NIXON have been designated managers of Bausch & Lomb Co.'s opthalmic and instrument divisions. These men, both members of the firm's board of directors and sales managers for many years, will have full charge of all phases of division operation.

LYSLE B. MCKINLEY, with B. & L. since 1929, will succeed Mr. NIXON as manager of the instrument sales division.

* * *

BERT SANFORD, theatrical sales manager for Altec Lansing, has returned from an extended trip through the South. He reports that all A-L dealers have received for display a scale model of the "Voice of the Theatre" loudspeaker system, and he urges projectionists to view these units.

* * *

S. G. ROSE has been named president, and HORACE JONES vice-president of Victor Animatograph Corp. ALEXANDER F. VICTOR, pioneer 16-mm worker who is retiring as president and as a director, will serve in future as a consulting engineer.

JONES is well known in the theatre field, having been prior to 1932 a branch manager for National Theatre Supply Co. In 1944 he headed the Allied Non-Theatrical Film Association, being re-elected in 1945.

* * *

CLYDE R. KEITH, New York engineering representative of W. E.'s Electrical Research Products division, has been elected editorial vice-president of the Society of Motion Picture Engineers. In this post, he will decide on questions of policy in connection with the publication of the *Journal* of the Society and supervise the work of the Papers Committee.

* * *

ADOLPH STUBER, Eastman Kodak Co. vice-president, and MARION B. FOLSOM, treasurer, have been elected members of Kodak's board of directors. Each of the new directors has had a Kodak career of more than thirty years.

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SOUND SYSTEM DEFINITIONS

(*Continued from page* 33)

in a detector a received voltage with a locally generated alternating voltage. The frequency of the locally generated voltage is commonly different from that of the received voltage. (Heterodyne reception is sometimes called beat reception.)

Indirectly Heated Cathode: A cathode of a thermionic tube, in which heat is supplied from a source other than the cathode itself.

Input Capacitance of a vacuum tube is the sum of the direct capacitances between the control grid and the cathode and such other electrodes as are operated at the alternating potential of the cathode. This is not the effective input capacitance which is a function of the impedances of the associated circuits.

Interelectrode Capacitance: The direct capacitance between two electrodes of an electron tube.

Linear Detection: That form of detection in which the audio output voltage under consideration is substantially proportional to the modulation envelope throughout the useful range of the detecting device.

Magnetic Loudspeaker: One in which the mechanical forces result from magnetic reactions.

Mercury-Vapor Rectifier: A mercury-vapor rectifier is a two-electrode, vacuum-tube rectifier which contains a small amount of mercury. During operation the mercury is vaporized. A characteristic of mercury-vapor rectifiers is the low voltage drop in the tube.

Mixer Tube (generally, in superheterodyne receivers): One in which a locally generated frequency is combined with the carrier- signal frequency to obtain a desired beat frequency.

Monochromatic Sensitivity: The responses of a phototube to light of a given color, or narrow frequency range.

Mu-Factor: A measure of the relative effect of the voltages on two electrodes upon the current in the circuit of any specified electrode. It is the ratio of the change in one electrode voltage to a change in the other electrode voltage, under the condition that a specified current remains unchanged.

Mutual Conductance: (See Grid-Plate Transconductance.)

Output Capacitance of a vacuum tube is the sum of the direct capacitances between the output electrode (usually the plate) and the cathode and such other electrodes as are operated at the alternating potential of the cathode. This is not the effective output capacitance which is a function of the impedances of the associated circuits.

Peak Forward Plate Voltage is the maximum instantaneous plate voltage in the direction in which the tube is designed to pass current.

Peak Inverse Plate Voltage is the maximum instantaneous plate voltage in the direction opposite to that in which the tube is designed to pass current.

Pentode: A type of thermionic tube containing a plate, a cathode, and three additional electrodes. (Ordinarily the three additional electrodes are of the nature of grids.)

Phototube: A vacuum tube in which electron emission is produced by the illumination of an electrode.

Plate: A common name for the principal anode in an electron tube.

Power Amplification (of an amplifier): The ratio of the alternating-current power produced in the output circuit to the alternating-current power supplied to the input circuit.

Power Detection: That form of detection in which the power output of the detecting device is used to supply a substantial amount of power directly to a device such as a loudspeaker or recorder.

Pulsating Current: A periodic current, that is, current passing through

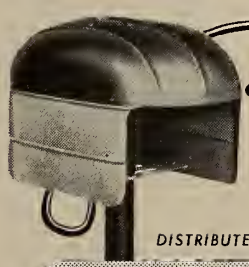
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successive cycles, the algebraic average value of which is not zero. A pulsating current is equivalent to the sum of an alternating and a direct current.

Rectifier: A device having an asymmetrical conduction characteristic which is used for the conversion of an alternating current into a pulsating current. Such devices include vacuum-tube rectifiers, gas rectifiers, oxide rectifiers, electrolytic rectifiers, etc.

Reflex Circuit Arrangement: One in which the signal is amplified, both before and after detection, in the same amplifier tube or tubes.

Regeneration: The process by which a part of the output power of an amplifying device reacts upon the input circuit in such a manner as to reinforce the initial power, thereby increasing the amplification. (Sometimes called "feedback" or "reaction.")

Screen Grid: A grid placed between a control grid and an anode, and maintained at a fixed positive potential, for the purpose of reducing the electrostatic influence of the anode in the space between the screen grid and the cathode.

Secondary Emission: Electron emission under the influence of electron or ion bombardment.

Sensitivity of a Phototube: The electrical current response of a phototube, with no impedance in its external circuit, to a specified amount and kind of light. It is usually expressed in terms of the current for a given radiant flux, or for a given luminous flux. In general, the sensitivity depends upon the tube voltage, flux intensity, and spectral distribution of the flux.

Static Sensitivity of a Phototube: The direct current response of a phototube to a light flux of specified value.

Superheterodyne Reception: Superheterodyne reception is a method of reception in which the received voltage is combined with the voltage from a local oscillator and converted into voltage of an intermediate frequency which is usually amplified and then detected to reproduce the original signal wave. (This is sometimes called double detection or supersonic reception.)

Television: The electrical transmission of a succession of images and their reception in such a way as to give a substantially continuous reproduction of the object or scene before the eye of a distant observer.

Tetrode: A type of thermionic tube containing a plate, a cathode, and two additional electrodes. (Ordinarily the two additional electrodes are of the nature of grids.)

Thermionic Emission: Electron or ion emission under the influence of heat.

Thermionic Tube: An electron tube in which the electron emission is produced by the heating of an electrode.

Total Emission: The value of the current carried by electrons emitted from a cathode under the influence of a voltage such as will draw away all the electrons emitted.

Transconductance: The ratio of the change in the current in the circuit of an electrode to the change in the voltage on another electrode, under the condition that all other voltages remain unchanged.

Triode: A type of thermionic tube containing an anode, a cathode, and third electrode, in which the current flowing between the anode and the cathode may be controlled by the voltage between the third electrode and the cathode.

Tuning: The adjustment of a circuit or system to secure optimum performance in relation to a frequency; commonly, the adjustment of a circuit or circuits of resonance.

Vacuum Phototube: A type which is evacuated to such a degree that the residual gas plays a negligible part in its operation.

Vacuum Tube: A device consisting of a number of electrodes contained within an evacuated enclosure.

Vacuum-Tube Transmitter: A radio transmitter in which vacuum tubes are utilized to convert the applied electric power into radio-frequency power.

Vacuum-Tube Voltmeter: A device utilizing the characteristics of a vacuum tube for measuring alternating voltages.

Voltage Amplification: The ratio of the alternating voltage produced at the output terminals of an amplifier to the alternating voltage impressed at the input terminals.

Capsule-Size RCA Phototube

RCA's new electron tube, designated 1P42, is the smallest phototube ever offered commercially. About the size of a .22 calibre long rifle cartridge, it has a maximum diameter of only ¼ inch and an overall length just under 1 13/32 inch. It is activated by light entering through a tiny window at its larger end.

Comparing favorably with larger phototubes in sensitivity, the tiny new tube is expected to find many applications in business and industry, particularly in devices and machines where the size of former phototubes has been a problem. In multiple-circuit control devices, the new tube makes possible either smaller devices or more circuits in the same space.



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MONTHLY CHAT

(*Continued from page* 5)

is required by law to display conspicuously a sign stating in large red letters the legally-imposed limit of occupancy. New York theatres, film and legitimate, were bagged via the strictest regulations imaginable many years ago.

Iowa is admittedly in bad shape on this proposition, but it has company in several other states with deficient or no safety laws. It is ironic that a Labor organization, smeared with the "self-interest" tag, has to fight this battle on behalf of the paying patrons of the world's fifth largest industry. Nor is it reasonable to expect that even a State Association can muster the strength to overcome the ignorance, the prejudices and the politicianing of a group of lawmakers.

What is needed in such instances is the powerful pressure that can be exerted only by such organizations as the National Fire Prevention Association, the General Office of the I. A., and the Society of Motion Picture Engineers, all of which outfits have a vital stake in the establishment and maintenance of standards. The S. M. P. E. might be expected to respond to an appeal from Iowa projectionists with the same alacrity as it did to the recent suggestion that it acquaint exhibitors with recommended practices relating to equipment.

Of course, politicians are immune to any amount of proof or persuasion that doesn't stem from an aroused public opinion. And molding public opinion is usually an expensive job, certainly beyond the resources of a small projectionist group. The fact that the Iowa boys seem destined to be knocked down for the fourth consecutive time in an unselfish effort to contribute something to the industry should lend emphasis to their poor-relation status in motion picture technological circles. Their cooperation is earnestly solicited in effecting "advances" in the art—provided some manufacturer is the beneficiary—but there is never an acknowledgment of their assistance when they need a lift.

We repeat what we have reiterated through the years: projectionists should be banded together in their own national technological group which would ensure it a respectful hearing on all matters affecting the craft, whether it be a matter of state legislation, the correction of projection room defects, or the attempted imposition of any practice adversely affecting craft welfare.

Prolonging Life of Pad Roller Arms

For pad roller arms of MI-1040 and similar soundheads using single rollers, periodic interchanging of upper and lower arms is suggested. These arms sometimes become sprung due to repeated lifting, by the outside end of the roller shaft, with a "heavy hand". However, they are sprung in an opposite manner; and periodic interchanging will generally be effective in maintaining the proper relation between sprocket and roller at both ends.

Guessing



can be expensive

Guessing can be expensive at any time but particularly so today with the present limitations on new projection room equipment and with the uncertainties of replacements. Every projectionist should know the whys and wherefores of his equipment. He should know what to do and what not to do when the equipment fails to function properly—and how to keep the show going until the service inspector arrives at the theatre.

PROJECTIONISTS' SERVICE MANUAL is a complete, compact compilation and a valuable reference work. All items therein are grouped according to classifications and contain sound practical suggestions relating to the many projection room troubles—their causes and how to remedy them.

A copy of this valuable trouble shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. local unions have ordered this book in bulk and placed a copy in each projection room. The price is right —only $3 per copy, postage prepaid. Order your copy now or ask your local union secretary about our special low-price bulk offer.

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Mr. R. L. Bostick, Manager
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We have recently had occasion to analyze more closely our maintenance cost on our projection booths throughout our circuit and in doing so it re-affirms the confidence that I have always had in Simplex projectors and the satisfaction that we have had from their use throughout this circuit over the past twenty-five years.

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APRIL 1947

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PICTURE QUIZ: Which of these five people gives the right reason for buying U.S. Bonds?

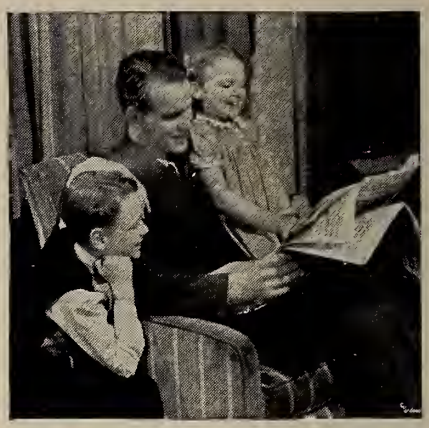
(ANSWER BELOW)



1. Easy to save! "I'm putting my money into U. S. Bonds because it's the *easiest way* for me to save. Under the Payroll Savings Plan, I put aside a regular amount each week for Bonds. So far, I've saved $500 without missing the money!"



2. Good investment! "Getting back $4 for every $3 I invest—the way I will in ten years' time with U. S. Bonds—is my idea of a *good investment.* I know it's safe and sound, too, because it's backed by Uncle Sam. Buy Bonds, I say."



3. Plans for the future! "Ten years from now, the money I'll get for my U.S. Bonds will help to send my kids to college, or buy our family a new home. I think that buying U. S. Bonds is the wisest thing a family man can do."



4. Fights inflation! "I want America to stay economically sound. That's why I'm putting all our extra dollars into U. S. Bonds. It's like buying a share in our country's future prosperity!"



5. Rainy day! "Maybe a rainy day's coming for me. Maybe it isn't. But I am taking no chances. That's why I'm buying all the U. S. Bonds I can through my Payroll Savings Plan."

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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 22 APRIL 1947 *Number* 4

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MONTHLY CHAT

STATING that examinations for a projectionist license in British Columbia are reputed to be the toughest in Canada, an exhibitor trade paper laments that only 3 out of 18 apprentices got their tickets at the recent examinations. The 15 who failed to pass the test will, under the law, have to wait another six months before trying again, the report continues, with the added wistful reflection that nearly all the entrants were returned veterans.

The implication of this news item is unmistakable: the British Columbia unions, in an effort to limit the number of journeymen projectionists, deliberately make the examinations so difficult as to practically preclude a passing mark for a majority of apprentices. The "veteran" angle is thrown in as an extra touch of sentimentality.

Film trade papers, and their exhibitor readers, have strange and invariably conflicting viewpoints anent projectionist competency. At wage-scale time the art of projection and its practitioners is talked down to a point where the process shapes up as a strictly button-pushing function which may easily be discharged by any "hack." On other occasions, and particularly when exhibitors would like to see the field flooded with nondescript manpower, the unions are "conspiring" to prevent the issuance of licenses by contriving "impossible" examinations.

As for the "veteran" angle, the writer, as a veteran himself, can sympathize with those British Columbia fellows who failed to make the grade; but he hastens to point out that one's war service alone does not qualify one for a given job, much less that of a professional projectionist. The armed forces' projection standards, the writer knows, bear little if any relation to the requisites of daily theatre projection.

The issue here is competency—nothing else—and neither the outcry of exhibitors, rumbling up from the depths of their pocketbooks, nor the laments of the exhibitor trade press should deter the organized craft from its steadfast insistence upon competency and then more competency. More than a little of this quality is needed by projectionists in hundreds of U. S. and Canadian theatres to protect themselves and their audiences from the incipient danger lurking in worn and outmoded equipment.

I. P. has long advocated not less but more and more exacting standards. And for the information of our exhibitor friends, it may be stated that there isn't a union official in the trade who doesn't realize that competency is all he has to sell. Those shows hitting the sheets smoothly and without mishap in thousands of theatres daily attest to this fact.

We say "Stand fast!" Because Mr. Exhibitor, despite his tendency toward ballyhoo and false front and with a penchant for watering the leaves and forgetting the roots, knows that his only merchandise is that image on the screen.

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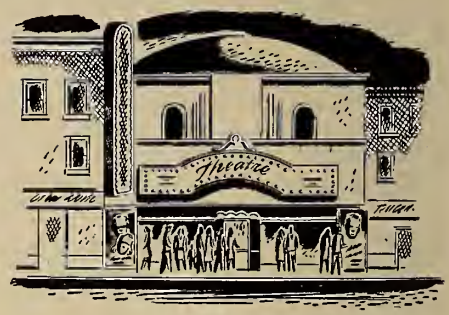


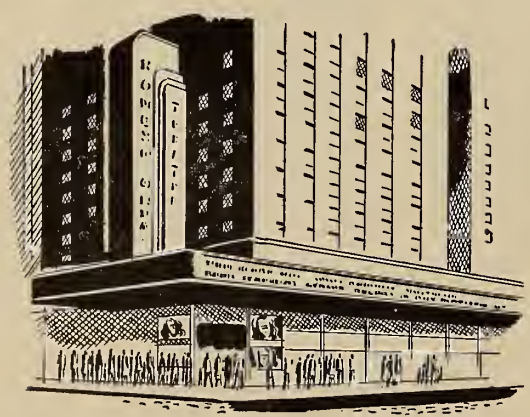
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Screen Illumination With Carbon Arc Projection Systems†

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Data are presented on the amount of light that can be projected to the screen with typical present-day carbon arc projection systems. Curves are presented which enable ready determination of illumination intensities on screens of various widths. Correlation is also made between the various systems and size of screen that can be illuminated to the brightness specified by the ASA Standard.

THE history of the motion picture industry is documented with many new developments in the light sources used for projection. The individual developments in the carbon arc systems used for theater projection have been described in many published papers. A paper[1] presented in 1940 summarized the progress in the application of carbon arcs to motion picture projection from the beginnings of the industry up to that time. In the years subsequent to 1940, new developments in carbons, lamps and optical systems have offered further substantial advances.

In view of these improvements it is the purpose of this article to present data on screen light obtained from measurements on typical present-day carbon arcs with various optical systems. Such a set of data is necessary for the determination of the projection system required to illuminate adequately a motion picture screen of a given size. It is also of benefit in planning for new fields of projection.

Projection Setup Data

The various units chosen as typical of present theatre practice include low-intensity carbon arc combinations with reflector optical system, high-intensity arcs with non-rotating carbons and reflector systems, and high-intensity arcs with rotating carbons and condenser optical system.

Mirrors 10 in. in diameter with a speed of F:2.3 and approximately 4- and 24-in. working distances were utilized to obtain representative information for low-intensity trim operation with 12-mm x 8-in. low-intensity positives and 8-mm x 8-in. low-intensity negative carbons.

"One Kilowatt" D.C. arcs with 7-mm "Suprex" positive carbons and 6-mm "Orotip" *C* negatives and with F: 2.5 mirrors having working distances of about 4-in. crater to mirror and 30-in. mirror to aperture were used as typical in this field.

Mirrors 14-in. in diameter with a speed of F: 2.3 and with working distances of approximately 5-in. from the carbon crater to the mirror, and 34 in. from the mirror to the aperture, were chosen as typical for simplified high-intensity lamps. The 8-mm x 12- or 14-in. "Suprex" positive and 7-mm x 9-in. "Orotip" *C* negative carbon trim, and the 7-mm x 12- or 14-in. "Suprex" positive and 6-mm x 9-in. "Orotip" *C* negative carbons were considered in combination with such lamps.

The rotating high-intensity carbon trims chosen were the 13.6-mm x 22-in. regular high-intensity and super-high-intensity positives with 7/16-in. or ½ x 9-in. "Orotip" negative carbons. Condenser lenses adjusted to give an F: 2.0 beam were employed as typical of good practice in this type of operation. The 6¼-in. diameter rear element was placed approximately 3 in. from the carbon crater and the 7½-in. diameter front condenser was about 12 13/16 in. from the film aperture.

The film aperture considered was the standard 0.600 x 0.825 in. for 35-mm film. Representative projection lenses designed for 35-mm film projection were utilized.

The measurements of screen illumina-

† J. Soc. Mot. Pict. Eng., January, 1947, p. 73.

tion were based on the following general procedure. First of all, the arc lamp, film aperture, and projection lens were positioned as specified by the equipment manufacturers' instructions. By this means, the mirror-to-aperture (or condenser-to-aperture) distance was adjusted and the carbon crater-to-mirror (or crater-to-condenser) distance was set approximately.

Optical alignment was achieved by placing a straight rod on the optical axis of the lamp, and by moving the aperture and projection lens so that the optical axes of the lamp, aperture, and lens all coincided.

For convenience, most measurements were obtained using a short projection throw of about 12 ft. and an illuminated screen area 2 to 3 ft. in width. However, a number of confirming tests were made with projection throws as long as 65 ft. and screen sizes as wide as 12 ft.

Light intensities on the screen were obtained using accurately calibrated Weston Photronic cells equipped with Viscor filters. The cells were placed at five locations on the screen: one at the center, two on a horizontal line through the center and near the sides, and the other two near diagonally opposite corners of the illuminated screen area. The side and corner cells were spaced in from the boundaries of the lighted screen area by distances equal to five per cent of the horizontal and vertical dimensions of the lighted area.

In order to obtain total lumens falling on the screen, it is necessary to have some method of averaging and weighing the values of intensity obtained at the five selected points. A satisfactorily close approximation to the average intensity has been found to be given by giving the center intensity a weight of two, the average of the sides a weight of two, and the average of the corners a weight of one. The average intensity so obtained is multiplied by the illuminated screen area to give total lumens.

Wire screens of calibrated transmission placed over the front of the lamp were found convenient to reduce the amount of light passing through the projection lens and to the screen. Some tests were carried out with no absorbing screens in order to check further on the accuracy of the transmission factors of the wire screens employed.

Before any light measurements were made, the intensities at the sides and corners of the screen were balanced by tilting the mirror or by moving the condenser lenses vertically or horizontally. The distribution of light on the screen, *i. e.*, the ratio of intensity, sides-to-center, was adjusted by axial movement of the carbons in the mirror lamps, or by axial adjustment of the condenser lenses in the condenser lamps.

In all cases, the positive carbon crater position, and the arc current and arc gap for the carbon trim were accurately maintained. The importance of close control of crater position and arc current to provide constant light on the screen has been described in a pevious paper.[2]

Discussion of Data

Results of measurements of screen light are shown in Table 1. The description of the carbon trim used, its operating conditions and the lamp optics are specified in the first five columns of Table 1.

Screen lumen values are next listed, both for a screen light distribution ratio of 80 per cent side-to-center, and for the ratio resulting when the system is adjusted to give maximum intensity at the center of the screen. With each such adjustment, an F: 2.5 and an F: 2.0 projection lens was employed. The F: 2.5 lens is untreated, and of 5.5 in. focal length, while the F: 2.0 lens, an example of a high-quality modern lens, is surface-treated and of 5 in. focal length.

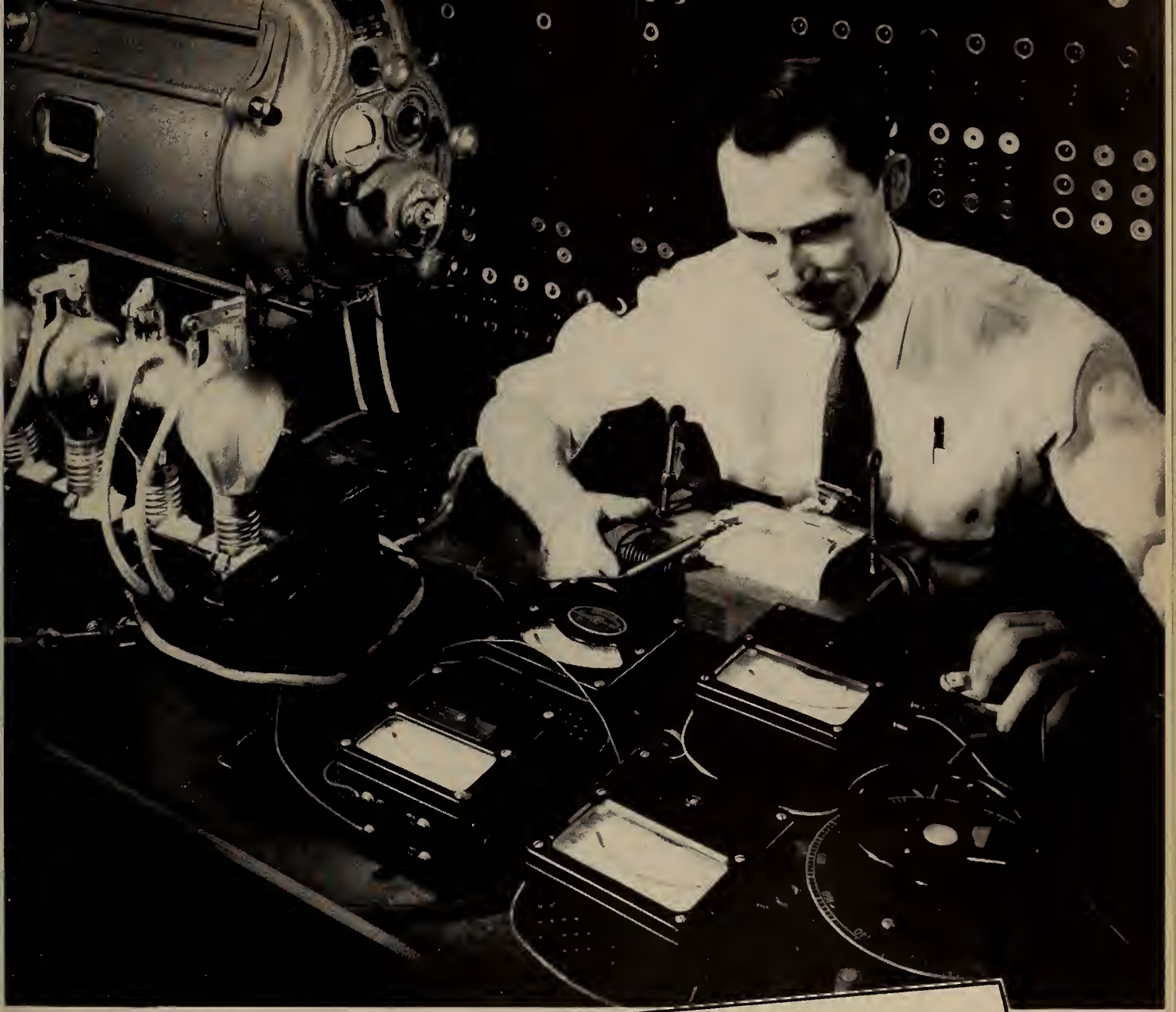
Similar measurements with other 4.5 and 5 in. e.f. F: 2.0 lenses of various make were also made, but gave no significant difference in amount of screen light.

The screen lumen values quoted are

TABLE 1: Screen Illumination with Carbon Arc Motion Picture Projection Systems
35-mm Film Projection Systems—0.600-in. x 0.825-in. Aperture

Item	Carbon		Arc		Lamp Optical System	5.5-in. E.F. *f*/2.5 Untreated Lens				5-in. E.F. *f*/2.0 Treated Lens			
						80 Per Cent Dist.		Max. Light[3]		80 Per Cent Dist.		Max. Light[3]	
	Positive	Negative	Amp	Volts		Screen Lumens[1]	Per Cent Dist.[2]	Screen Lumens	Per Cent Dist.	Screen Lumens	Per Cent Dist.	Screen Lumens	Per Cent Dist.
	Low Intensity												
1	12 mm × 8 in. Low Int. *"One Kilowatt," D-C*	8 mm × 8 in. Low Int.	32	55	10 in. Dia. *f*/2.3 Mirror	....	..	2,500	70	....	..	3,400	70
2	7 mm × 12 or 14 in. "Suprex" *Nonrotating High Intensity*	6 mm × 9 in. "Orotip" *C*	40	27.5	11 3/8 in. Dia. *f*/2.5 Mirror	4,600	80	5,000	65	5,900	80	6,500	65
3	7 mm × 12 or 14 in. "Suprex"	6 mm × 9 in. "Orotip" *C*	42	33	14 in. Dia. *f*/2.3 Mirror	4,900	80	5,500	60	6,600	80	7,500	60
4	7 mm × 12 or 14 in. "Suprex"	6 mm × 9 in. "Orotip" *C*	50	37	14 in. Dia. *f*/2.3 Mirror	6,400	80	7,200	60	8,600	80	10,000	60
5	8 mm × 12 or 14 in. "Suprex"	7 mm × 9 in. "Orotip" *C*	60	36	14 in. Dia. *f*/2.3 Mirror	7,600	80	8,200	65	10,300	80	11,000	65
6	8 mm × 12 or 14 in. "Suprex" *Rotating High Intensity*	7 mm × 9 in. "Orotip" *C*	70	40	14 in. Dia. *f*/2.3 Mirror	9,600	80	10,600	65	13,000	80	14,000	65
7	13.6 mm × 22 in. High Int.	7/16 × 9 in. "Orotip"	125	68	Condenser Lenses at *f*/2.0	7,500	80	9,200	65	11,500	80	14,500	60
8	13.6 mm × 22 in. High Int.[4]	1/2 × 9 in. "Orotip"	150	78	Condenser Lenses at *f*/2.0	11,000	80	13,000	60	16,000	80	19,500	60
9	13.6 mm × 22 in. Super-High Int.[4]	1/2 × 9 in. Heavy Duty "Orotip"	170	75	Condenser Lenses at *f*/2.0	11,000	80	13,000	65	18,500	80	21,500	60

NOTES: 1. Screen lumen figure is for systems with no shutter, film, or filters of any kind.
2. Per cent distribution refers to ratio of light intensity at side of screen to that at the center.
3. Maximum light is value with system adjusted to produce maximum light intensity at the center of the screen.
4. Heat filter may be necessary; reduce light approximately 20 per cent if Aklo or Phosphate glass is used.



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without allowance for shutters, filters, *etc.*, since these more general light values can readily be corrected for the transmission of the particular accessories incorporated in a specific assembly of interest. The data in Table 1 show screen lumen values at maximum light ranging from 2500 to 21,500 and illustrate the wide range of possibilities offered by the various combinations of lamps, carbons, and optical systems.

It will be noted that the side-to-center screen distribution at maximum light is generally 60 or 65 per cent. If a more uniform distribution of light be desired, this can be obtained at a sacrifice in intensity. Values of screen lumens are quoted at 80 per cent distribution as an example of a more uniform distribution and are approximately 10 to 15 per cent lower than maximum values.

The importance of adequate lens speed in utilizing the light provided by the projection lamp is also illustrated by the data. The F: 2.0 treated lens gives approximately 50 to 60 per cent more light than the F: 2.5 untreated lens with the condenser lamp, and 30 to 35 per cent more with the mirror lamps. Much of the gain with the mirror systems results from the greater transmission of the treated lens.

There is an additional gain with the condenser system because the F: 2.0 lens transmits light from the F: 2.0 condenser system which is not passed by the slower speed F: 2.5 lens.

Factors Affecting Results

In order to compare the screen light intensity in motion picture theatres it is necessary to take into account such other factors as projector shutter, heat filters, port glasses, draft glasses and screen size. Values of light intensity in foot-candles at the center of the screen are plotted for a range of screen widths in Figs. 1 to 4. These are based on the various projection systems and conditions of Table 1, and allowance has been made for:

(1) A projector shutter of 50 per cent transmission,

(2) A projection room port glass of 90 per cent transmission.

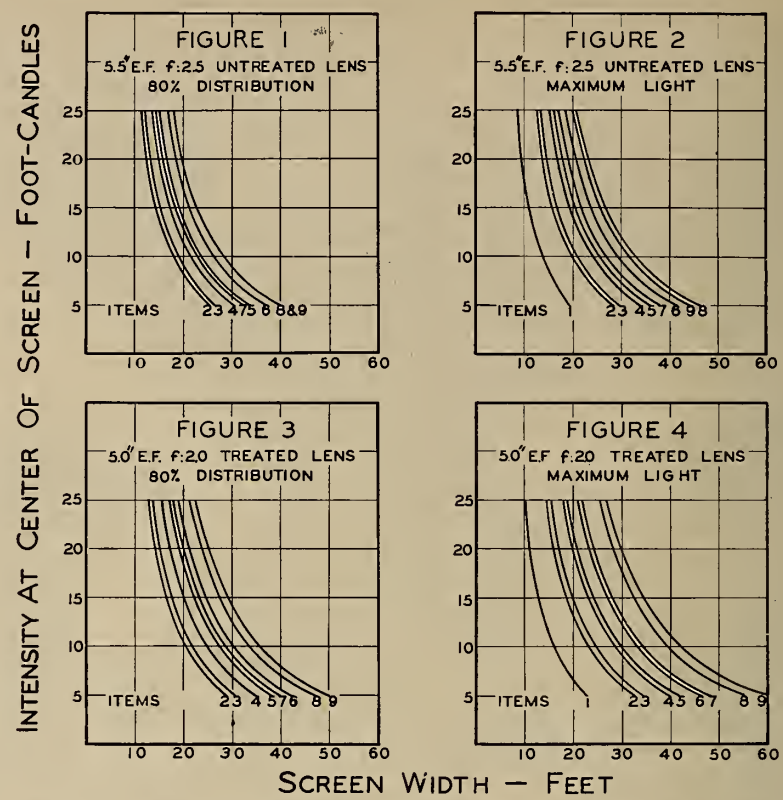
The values obtained in a particular theatre installation may differ from those reported here for numerous reasons, among which are the following:

(1) Departure from the optical characteristics specified in Table 1. For example, many of the older lenses are of slower speed than F: 2.5.

(2) The possible presence of absorptive factors in the optical train other than the ones assumed here. For instance, shutter transmission may be other than 50 per cent, a heat filter is sometimes employed, a draft glass is often used, and the present assumption with respect to the port glass may not apply.

(3) Degree of cleanliness or misalignment of the optical system.

(4) Departure from the specified operating conditions for the arc.



FIGS. 1, 2, 3 and 4: Light intensity[3] at center of various sized screens with typical carbon arc projection systems.

ITEMS[1]

(1) 12-8-mm Low Intensity, 32 amp., 55 volts; (2) 7-6-mm "Suprex," 40 amp., 27.5 volts; (3) 7-6-mm "Suprex," 42 amp., 33 volts; (4) 7-6-mm "Suprex," 50 amp., 37 volts; (5) 8-7-mm "Suprex," 60 amp., 36 volts. (6) 8-7-mm "Suprex," 70 amp., 40 volts; (7) 13.6-mm-$\frac{7}{16}$" High Intensity, 125 amp., 68 volts; (8) 13.6-mm-½" High Intensity, 150 amp., 78 volts[2]; (9) 13.6-mm-½" Super-High Intensity, 170 amp., 75 volts[2].

NOTES

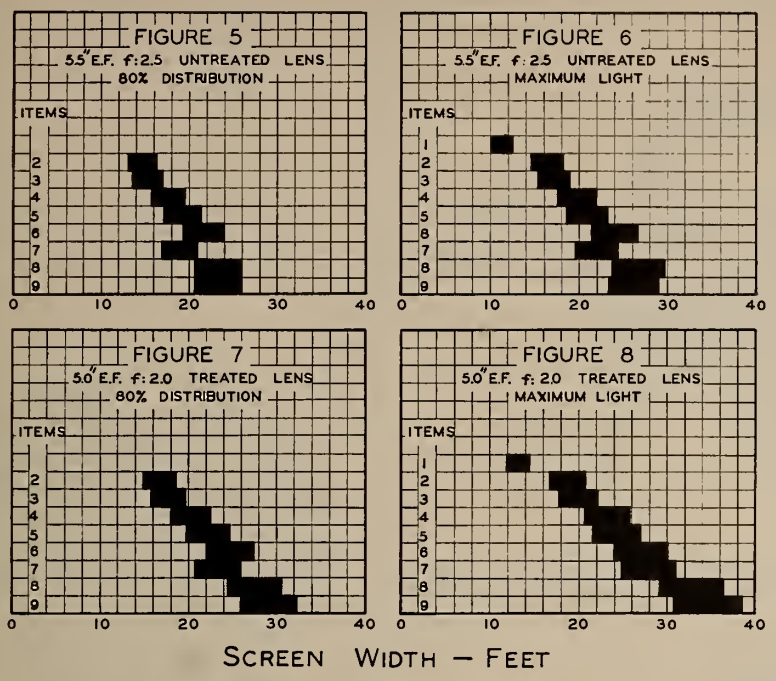
(1) Refer to Table 1 for details on items; (2) May require heat filter and result in 10 per cent decrease in width at given intensity; (3) Foot-candle values assume—(*a*) 50 per cent shutter transmission; (*b*) 90 per cent projection port glass transmission; (*c*) No film or filters other than port glass.

Figures 1 and 2 show the foot-candle intensities at the center of the screen under the aforementioned conditions for 80 per cent distribution and maximum light with the F: 2.5 untreated lens. Figs 3 and 4 show similar data with the F: 2.0 treated lens. These curves show the screen widths that can be illuminated to intensities of 5 to 25 foot-candles. The screen widths involved range trom about 10 to 60 ft.

It is perhaps worthy of note that in Fig. 2 with the F: 2.5 lens Item 8, the 150-amp arc, gives higher screen intensity than Item 9, the 170-amp arc, whereas this is not the case in the other three illustrations. The explanation for this anomaly rests on the relatively greater radiation of the 170-amp carbon at wide angles. It is necessary to use the higher speed of the F: 2.0 lens in order to obtain the higher light from the 170-amp arc.

In order to ensure a sufficient screen brightness for proper viewing conditions, the A.S.A. Standard *Z22.39-1944* has specified that "The brightness in the center of a screen for viewing 35-mm motion pictures shall be $10 \pm \frac{4}{1}$ foot-lamberts when the projector is running with no film in the gate."

The screen light intensities in Figs. 1 to 4 can be converted to screen brightness in foot-lamberts by multiplication by the screen reflectivity. This has been done using a screen reflectivity of 75 per cent and the resultant data have been used to plot Figs. 5 to 8. These block



FIGS. 5, 6, 7, and 8: Size of screens capable of illumination to 9 to 14 foot-lamberts at center with various projection systems.

ITEMS[1]

(1) 12-8-mm Low Intensity, 32 amp., 55 volts; (2) 7-6-mm "Suprex," 40 amp., 27.5 volts; (3) 7-6-mm "Suprex," 42 amp., 33 volts; (4) 7-6-mm "Suprex," 50 amp., 37 volts; (5) 8-7-mm "Suprex," 60 amp., 36 volts. (6) 8-7-mm "Suprex," 70 amp., 40 volts; (7) 13.6-mm-$\frac{7}{16}$" High Intensity, 125 amp., 68 volts; (8) 13.6-mm-½" High Intensity, 150 amp., 78 volts[2]; (9) 13.6-mm-½" Super-High Intensity, 170 amp., 75 volts[2].

NOTES

(1) Refer to Table 1 for details on items; (2) May require heat filter and result in 10 per cent decrease in width at given brightness; (3) Foot-Lambert values assume—(*a*) 50 per cent shutter transmission; (*b*) 90 per cent projection port glass transmission; (*c*) No film or filters other than port glass; (*d*) Diffusing screen with 75 per cent reflectivity.

diagrams define the widths of screen which can be illuminated within the brightness limits of the A.S.A. Standard just quoted by each of the nine projection systems with the screen distribution and projection lens specified. It should be noted again that this is a general guide and variations from these data will occur under the conditions previously described.

Interpreting Relative Data

As an example of the use of the illustrations, Item 2, the "One Kilowatt" direct-current system, is shown in Fig. 5 as being capable of illuminating screens 13 to 16.5 ft. wide at 14 to 9 foot-lamberts respectively, with an F: 2.5 untreated lens and with an 80 per cent screen distribution. If an F: 2.0 treated lens is substituted, larger screens of 15 to 18½ ft. can be illuminated as shown in Fig. 7.

If now this same system is adjusted for maximum intensity at the center of the screen then the widths become 14½ to 18 ft. with an F: 2.5 untreated (Fig. 6) and 16½ to 21 ft. with an F: 2.0 treated lens (Fig. 8).

It is worthy of note that the nine typical systems described are capable of covering a screen width range of 10 to 39 ft. to recommended brightness levels.

Projection systems employing F: 2.0 condenser lenses (Items *8* and *9*, Table 1) sometimes produce an "in and out of focus" flutter of the film in the aperture,[3] so that heat filters or other means may be necessary to prevent such action. If filters of Aklo or Phosphate glass[4] are so used, the light values quoted in Table 1 will be reduced by approximately 20 per cent and the screen widths in Figs. 1 to 8, inclusive, will be reduced by about 10 per cent. because of the light absorption by the heat filter.

Future Prospects Bright

Although the discussion of screen illumination in this paper has been confined to systems commercially available at present, it should be kept in mind that experimental systems[5] are capable of delivering considerably more light than any of those described, and it is to be expected that the continued developments of higher brightness carbons and improvements in optics will enable the achievement of still greater screen lumen values.

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[5] JONES, M. T. ZAVESKY, R. J., AND LOZIER, W. W.: "A New Carbon for Increased Light in Studio and Theatre Projection," *J. Soc. Mot. Pict. Eng., 45*, 6 (Dec. 1945), p. 229.

'Matchbox' Camera For OSS Disclosed by Eastman

Eastman Kodak Co. has disclosed the story of how it had secretly designed and built 1,000 tiny cameras of matchbox size for use by the OSS and underground forces during the war. Small enough for concealment in a person's hand, the camera was yet capable of snapping pictures about ½ inch square that could be enlarged many diameters and still retain their clarity.

In addition, Kodak also supplied OSS with "vestpocket darkroom" kits containing several rolls of 16-mm film, photographic developing and fixing chemicals in pill form, a small chamois for wiping the developed film dry, mixing spoon, film clips, and a pencil-size solution agitating stick. By means of this miniature darkroom equipment the film could be developed in a small glass holding a jigger of solution.

Has 45-Degree Viewing Angle

The "matchbox" camera took film in coils or spools in lengths of about 2 feet. It produced about 30 exposures, had an F:5 lens with one stop to shut the aperture to F:11 and operated at a shutter speed of about 1/50th second. With a one inch focal length, the lens had an angle of view of approximately 45 degrees, which permitted picture-shooting "from the hip." The subject was in focus from about 8 feet to infinity.

Functioning with but a slight click, the "M.B." had no view finder and was operated simply by aiming at the subject, then pushing a small plunger. A wire lever enabled the taking of time exposures as well. For copying photographs or printed matter the camera was set in a small stand equipped with a close-up lens. In this manner it served as a photo-recording apparatus for reproducing documents and similar material.

RCA 1946 Net Down Slightly

RCA net earnings in 1946 amounted to $10,985,053, equal to 56.4 cents per share on the common stock. Earnings for 1945 were $11,317,068, equal, after preferred dividends to 58.8 cents per common share.

Gross income for 1946 amounted to $236,980,770, a decrease of 15.2 per cent from the $279,503,615 reported in 1945, when the company was still engaged in filling substantial Government orders.

Two New 35-mm Projection Test Reels

SMPE-Research Council's Visual Targets; Altec's Sound Service Reel

TWO new 35-mm test reels enabling precise checking of both visual and sound reproduction facilities have just been announced. The visual test reel, a joint endeavor of the Society of Motion Picture Engineers and the Research Council of the Academy of Motion Picture Arts & Sciences, is available to all purchasers; while the sound system test film will be used exclusively by servicemen for Altec Lansing Corp., which developed the reel in cooperation with the two aforementioned organizations.

Detailed descriptions of both these testing aids are appended hereto. with data anent the SMPE-Research Council visual test being presented first.

SMPE-Research Council Reel

When installing new projectors and screens or performing maintenance operations on existing equipment, servicemen and projectionists have been forced to work without adequate test standards for checking picture head performance. As a result, adjusting the position of two projector heads so that both pictures exactly fill the screen and properly masking the picture being projected were extremely laborious and time-consuming. This new test film will make checking more efficient and quicker.

The film, 415 ft. in length and printed on safety stock, is silent and is made up of four separate target sections. It has a conventional starting mark and threading leader.

The Focus-and-Alignment target shows whether or not picture size and screen masking are correct, and whether the projected picture is centered properly on the screen.

The Travel-Ghost target shows improper timing of the shutter quite readily and gives an easy indication of the carrect adjustment as the timing is being corrected.

The Jump-and-Weave target gives an accurate indication of the unsteadiness of the projected picture. Picture jump is measured in per cent of picture height, and picture weave in per cent of picture width.

The Lens-Aberrations target shows picture distortion and gives an indication of the lack of sharpness that will be present in pictures shown on any particular projector.

Because some users prefer loops or continuous lengths of the separate target sections for adjusting machines, one at a time or in pairs, separate sections of the first three targets have been made available. They may be purchased separately in 100- to 900-ft. lengths in multiples of 100 ft.

Picture loops are difficult to handle in most projectors, particularly where high-intensity lamps are used, because of shrinkage from high heat concentration, therefore for regular maintenance programs it is suggested that separate sections in convenient continuous lengths be used and replaced as they become worn.

Focus-and-Alignment

This target should be focused properly and framed evenly top and bottom, and it will then show whether or not picture size and screen masking are correct. The letter "A" will appear in each corner and in the middle of each side just inside the screen border when the picture is the proper size and is centered properly on the screen. If some of the "A's" do not appear, the screen is masked too far in.

If the target is surrounded by a cross-hatched border, the screen is not masked closely enough. Appearance of the cross-hatched border on only one side shows either that the projected light is not centered properly on the screen or that the film is running off center in the projector gate. In any event a re-running of the film with an observer at the screen should indicate just what corrections are required.

Adjustments shown necessary by this target will usually be obvious. However, the following information is provided to assist in making whatever changes are necessary. The figures are not critical, but will serve as a general guide.

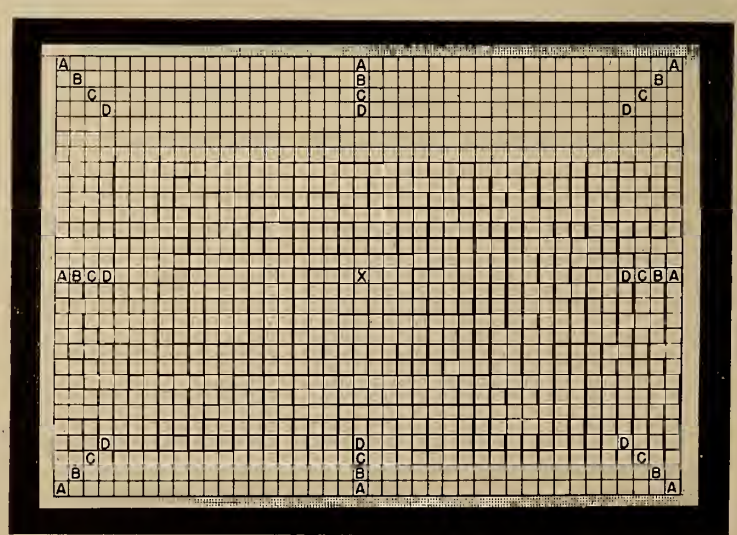
It is customary to provide 1 inch of black masking on each of the four sides of a 9 x 12 ft. screen. This means that there should be about ½ inch of masking on each of the four sides of the screen for every 6 ft. of picture width.

Where the projection angle is steep, standard practice is to "square up" the picture by adjusting the masking at the sides of the screen, and often by changing the shape of the projector aperture mask. In cases of extreme keystoning, picture size is necessarily reduced somewhat, and some theatres "cheat" a little on the border by widening the bottom of the aperture mask to project slightly more than the standard width of the top of the picture.

If at all, this should be done with great caution. Not more than ½ inch for each 6 ft. of picture width can be gained on the left side of the screen with any degree of safety, and not more than 1 to 1½ inch for each 6 ft. of picture width can safely be gained on the right side of the screen.

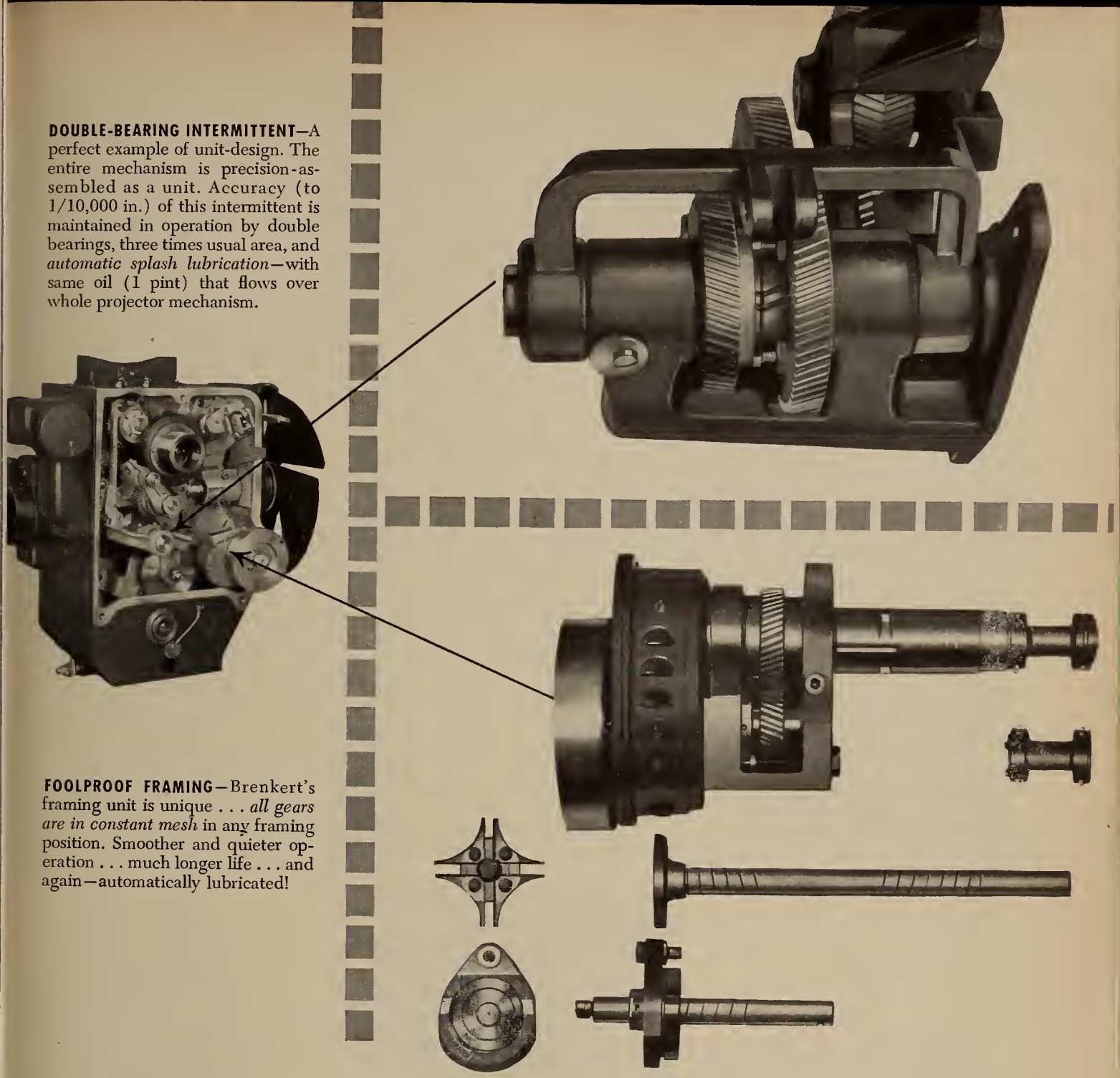
If this is the only solution to your masking problem, be sure to measure carefully because you will be getting dangerously close to the edge of the picture on the film. To check the margin of safety, pull out the aperture mask, if it be removable. while the film is running, and hold a white card over the screen masking. The outside edge of the cross-hatching will then show the actual limits of the picture.

As a general rule, the safest procedure is to avoid encroaching on the cross-hatched area, because some day you may get a print with an undersized picture. caused by shrinkage or non-standard printing, which will project so that its



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DOUBLE-BEARING INTERMITTENT—A perfect example of unit-design. The entire mechanism is precision-assembled as a unit. Accuracy (to 1/10,000 in.) of this intermittent is maintained in operation by double bearings, three times usual area, and *automatic splash lubrication*—with same oil (1 pint) that flows over whole projector mechanism.



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How *UNIT-CONSTRUCTION* of the BRENKERT "80" makes your job easier

The Brenkert "80" Projector is a masterpiece of accurate sub-assembly construction for easy replacement of parts. It is easier to operate . . . and far simpler to maintain than any other projector used in modern theatres.

As an example, you can remove and replace the entire intermittent assembly—*and re-time the shutter*—in less time than it takes to run off a single reel! The intermittent sprocket can be replaced *in one minute flat* without disturbing the intermittent mechanism or projector timing.

Other time-saving advantages: the film gate assembly is held by only one hand screw, accurately aligned by two pins. *One* master screw adjusts all gate springs at once with uniform tension. The aperture plate slides out instantly for cleaning.

All Brenkert parts are assembled by units, in the same easy-to-get-at way—making your job easier—requiring less time for maintenance.

For descriptions of the many other features of the Brenkert "80", write Dept. 43-D.

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RCA Service Co.
Service and Replacement Parts

THEATRE EQUIPMENT
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

own frame line shows inside the masking. The result will be a fuzzy edge at one or both sides of the picture, and the picture may appear to be unsteady.

Travel-Ghost Target

This target will show improper timing of the shutter by showing a fuzzy outline on the several "T" patterns, with a pronounced "Christmas Tree" effect above or below the horizontal lines and in line with the uprights of the "T's".

Fuzzy outlines or travel-ghost "tails" appearing above some or all of the patterns indicate that the shutter is closing too late. (The film has started to move before the shutter closes.) Travel-ghost "tails" appearing below the patterns indicate that the shutter is opening too soon. (The shutter has opened before the film has stopped moving.)

As travel-ghost is reduced by adjusting the shutter, the tails will gradually disappear, and a slight further adjustment of the shutter control should make the previously fuzzy lines crisp and clear.

In some rare cases it is possible that no position of the shutter control will completely eliminate travel-ghost. In such an instance the shutter blade is probably effectively too narrow and a more serious correction is required.

Jump-and-Weave Target

This target will show the amount of projected picture unsteadiness, measured in per cent of picture height for jump and in per cent of picture width for weave.

Each step of the triangular white areas at the top and bottom of the screen represents 1% of picture height. This makes it a simple matter to estimate the amount of jump in fractions of a per cent. Opening and closing of the white areas can be judged best by an observer standing just far enough back from the screen so that color fringes are not readily apparent.

Weave may be determined in the same way, because each step of the triangular white areas at the sides of the screen represents 1% of the picture width.

When adjusting to reduce unsteadiness of a projector head, be sure to follow the recommendations of the manufacturer for the particular type or model of projector.

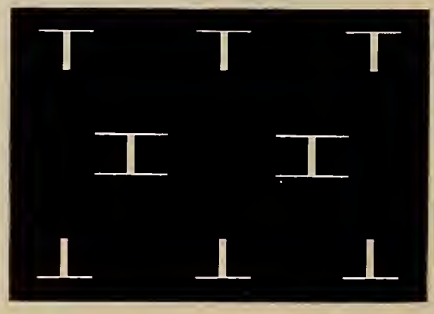
Gate tension, loop size, intermittent sprocket wear, wear of the intermittent movement, and movement or vibration of the entire projector may all contribute to unsteadiness of the picture on the screen. As many of these obvious causes as possible should be checked and eliminated before contemplating any expensive overhauling to improve performance.

Separate lengths of the Jump-and-Weave target, where used, should be run full length and not as loops, because in a loop the large black area will get very hot, with increasing tendency to shrink and buckle, making the test unreliable. If used, handled, and stored correctly, the film should last a long time, but should be replaced as soon as it begins to show signs of wear or buckling.

Lens-Aberrations Target

This target will indicate fall-off in sharpness over the screen by a fuzziness of the vertical and horizontal lines, and this indicates the lack of sharpness present in pictures shown on that same projector.

Distortion (the curving of straight lines) at top and bottom of the screen is shown by the horizontal line pattern; while the same effect at the sides of the screen is shown by the vertical line patterm. Cleaning, accurate focusing and correct alignment of the optical system are about all that can be done to improve optical performance. Because it is not necessary to run the film while making such adjustments, separate sections of this target have not been made available.



TRAVEL-GHOST TARGET



JUMP AND WEAVE TARGET

When Ordering Visual Test Film or Replacements

Orders for the visual test reel should be designated at follows:

Research Council—SMPE 35-mm Visual Test Film

and should be sent to either the Society of Motion Picture Engineers, Hotel Pennsylvania, New York 1, N. Y., or the Research Council, Academy of Motion Picture Arts & Sciences, Taft Building, Hollywood, Calif. Price: $17.50 complete, including shipping charges within the U. S. A. Additional charge for export shipping.

When ordering replacement loops of target patterns designate as follows:

1. **35-mm Visual Test Film: Focus-and-Alignment Section**
2. **35-mm Picture Test Film: Travel-Ghost Target Section**
3. **35-mm Picture Test Film: Jump-and-Weave Target Section**

Order any length desired from 100 to 900 ft. in multiples of 100 ft., at $5 per 100 ft. The most suitable and convenient length at reasonable cost for average use is probably 200 ft.

Care of Test Films

REMEMBER—Test films are precision tools and must be handled with care.

1. Keep them clean.

2. Use as often as required, but do not run them unnecessarily.

3. When you finish a test run, rewind the film with firm tension on its original reel. Replace with a reel band, in its original can, tape the can securely and store it in a safe, cool place.

Altec's ED-35 Sound System Transmission Test Film

A new ED-35 Transmission Test Film has been developed by the Altec Service Corp. with the aid of the Academy of M. P. Arts & Sciences and the S.M.P.E. This new film is of laboratory precision, is printed on safety stock and contains two sound tracks.

One track, entitled "Multi-Frequency Test," starts with a short section of "buzz track" to indicate whether the guide rollers of the film reproducer are correctly set. Following this section is a series of constant frequency sections in this c. p. s. order: 100, 40, 70, 130, 300, 500, 2000, 3000, 7000, and 8000.

For the convenience of the serviceman, the low frequencies are recorded at reduced level, and announcements precede all sections except for a few of the higher frequencies. The interval between 7- and 8000 cycles consists of unmodulated track exposed to a density equal to the average density of the recorder sections to permit the evaluation of the effect of film noise on the readings.

New Technique Assures Accuracy

The second section is entitled "Flutter Test" and contains a strip of 3000-cycle sound and a section of sustained chords

(*Continued on page* 26)





Artist . . . with light and shadow

● To hold the drama which darkness gave this scene, yet not sacrifice identity and clarity of action . . . this was the problem on which the picture's director and the director of photography worked hard—and successfully.

To this same end the timer also worked—successfully. By his skilled selection of printing light, his judgment of light and shadow, he faithfully interpreted the director's aim . . . made certain that the visual result would be vivid, dramatic, convincing.

To get the most from his ability, the timer must work with film of assured uniformity . . . one of the many qualities which make the family of Eastman motion picture films so useful to the industry.

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Concentrated-Arc Light Sources

With Special Emphasis on the Literature of the Prior Art

THE continuing avid interest of both the technical and lay press in the Western Union concentrated-arc (zirconium) lamp, as reflected by persistent efforts to invest it with properties which will shortly "revolutionize" lighting practices in both the production and exhibition of motion pictures, prompted a delving into the literature of the prior art in an effort to ascertain just what degree of "disclosure" is evidenced by this light source.

Readers of I. P. will recall previous discussions of the W. U. lamp in these columns[1, 2] in which were advanced cogent reasons why this unit is at present unsuitable for motion picture projection.

That concentrated-arc light sources are by no means new is made clear by even a cursory inspection of the literature of the prior art. But even well-informed workers in the art might be surprised to encounter certain references dating back many years which, in terms of construction and operation, bear a striking similarity to the W. U. lamp.

Early Significant References

Of extreme significance are the references contained in the following U. S. patent issues:

1,152,675—Vreeland (Sept. 7, 1915)
1,154,514—Jacoby (Sept. 21. 1915)
1,178,542—Skaupy (April 11, 1916)
1,266,517—Meikle (May 14, 1918)
1,393,520—Friederich (Oct. 2, 1919)

Nor is this all. But before considering even more persuasive evidence bearing on the "newness" of concentrated-arc light sources, some brief comment on the foregoing seems in order.

Messrs. Vreeland, Jacoby, Skaupy and Meikle all disclosed, in varying degree, data relative to circuit, construction and operation of a light source which may be, without undue mental strain, related to the W. U. lamp of current vintage.

Friederich utilized a tungsten filament to effect a "line source of light," which feature of the W. U. lamp has elicited such loud bravos from press commentators. Incidentally, Friederich actually showed but did not claim means for using his lamp as a rectifier—which claim the enterprising Meikle lost no time in staking out. This claim was subsequently adjudicated and held valid in a court action in which General Electric was the plaintiff.

Also providing interesting reading is a disclosure made in 1919 by J. K. Elderkin (Forest Manufacturing Corp.). This relates primarily to a rectifier lamp but also shows specifically a corollary use as a "point source of light." This disclosure, prescribing the use of "any metal, preferably tungsten," anticipates the W. U. lamp in that it shows the same means for starting the lamp on high voltage and then cutting it off to operate a "pointed electrode" on low voltage. The only variance between the two light sources is the *shape* of the electrode.

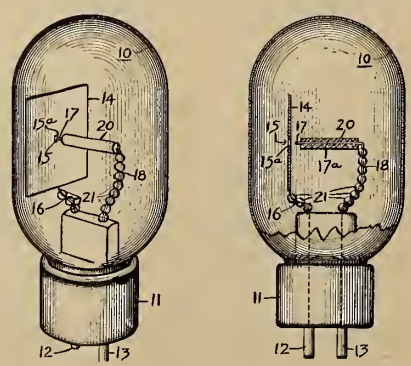
R. T. Cloud's Prophetic Patents

However energetic and imaginative were these early workers, it remained for one Raymond T. Cloud, as early as 1933, to forecast with pinpoint accuracy almost the exact principles which 13 years later were to gain for the W. U. lamp such widespread, if undiscriminating, kudos on the score of "originality." The portentous story is told in the following U. S. patents:

1,898,032—Cloud (Feb. 21, 1933)
1,905,153—Cloud (April 25, 1933)

It would require considerably more effort than is involved in straining after the proverbial gnat to detect any but the most minute difference between the Cloud lamp and the W. U. unit; "identical" is the only acceptable term for describing the relationship of one lamp to the other, step-by-step from conception down to the finished product and its method of operation.

Cloud shows specifically and in great detail all those elements which have led the unsuspecting to classify the W. U. lamp as "unique":



CLOUD'S CONCENTRATED-ARC LAMP
Left: side elevation of preferred form of lamp with the electrodes in perspective. Right: medial vertical section, showing the bulb and electrodes of sketch at left.

The glass envelope itself; the character and positioning of a cathode, an anode and a starting electrode; the use of a molten oxide having a high melting point which is contained in a tiny recess in a holder; utilization of a high-potential power pack for starting, with subsequent low-voltage operation; effective shielding of the incandescent area to restrict light emission; specific mention of "any refractory material" (which W. U.'s zirconium certainly is)—right down the line Cloud delineates precisely the same type light source as represented by the W. U. lamp.

Cites Reproducing Application

Cloud's primary objective, of course, was the production of a sound-film recording lamp; but he raised his sights materially in the following specific language:

> "The invention is not limited to recording, since without modulation of the light, as by voice currents, its constancy and brightness are *ideal for a lamp for reproducing* (italics ours). In such case the amount of light or intensity required will indicate a larger bright area. . . ."

The fact that Cloud stressed the use of barium oxide, as compared with W. U.'s use of zirconium oxide, is as Tweedledee compared with Tweedledum, since Cloud specifies the use of "any metal oxide having a high melting point". Mere reference to easily available critical tables of substances and their melting points hardly constitutes initiative, much less "invention".

Relative to the "point source" of the respective lamps, the Cloud specifications provide for a light-emitting area of from 1/6,000th to 1/10,000 inch, and he demonstrates his capability of obtaining successful operation within these dimensions. Naturally, it follows that the larger the crater size the less concentration of light there will be on a given point.

Cloud further cites the results of photometric tests which indicate for his lamp a brightness of approximately 100 candlepower per square mm., as contrasted with W. U.'s own published figure of about 56 c.p. (and other investigators' figure of about 46-50 c.p.) per square mm. for the zirconium lamp.

The fact that the W. U. 2-watt lamp shows a higher brilliance than does its 100-watt unit (70 c.p. as against 50 c.p. per square mm., respectively) invites speculation anent the possibility of radically decreasing brilliancy per square mm. with increasing size and wattage.

Contrast these figures with the 550 c.p.

(*Continued on page* 26)

[1] "The W. U. Concentrated-Arc Lamp," I. P. for April, 1946, p. 16.

[2] "A Crystal-Gazer at Work," I. P. for June, 1946, p. 12.

for

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better projection...
greater economy...

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NATIONAL

PROJECTION LIGHTING EQUIPMENT



The National Four-Tube Rectifier for 40 and 50 ampere High Intensity Projection Arcs.



The National Heavy Duty Six-Tube Rectifier for use with Magnarcs.



The National Heavy Duty Two-Tube Rectifier for 15 and 30 ampere Low Intensity Projection Arcs.



The Acme Two-Tube 30 ampere Rectifier for Low Intensity Projection Arcs.

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24-Frame/p.s. Projection vs. 30-Frame Video Rate

Difference in standards is reflected in mechanical changes made in new RCA TP-16A 16-mm tele film projector.

RCA RESEARCH LABORATORIES, PRINCETON, N. J.

THE many projectionists who through having taken special courses to fit them for active participation in the theatre television field, no less than their fellow craftsmen who have adopted self-training methods through intensive reading and the like, will be especially interested in the technical data relative to the new RCA TP-16A 16-mm film projector designed for operation with a television camera and facilitating the use of newsreels, short film subjects and film commercials for low-cost television programming.

Projectionists will find much of interest in these data, not only from the standpoint of their application to the video art but also as a highly interesting comparison with the more familiar standard types of 16-mm projectors.

This new TP-16A projector, an adaptation of the well-known standard RCA 16-mm mechanism, has been modified to project motion pictures onto the mosaic of a pickup tube in a television camera where the varying light values of the film are translated into video signals for transmission.

But, it may be asked, don't motion picture projection standards differ from those applying to television? The answer is that they certainly do—and therein lies the reason for this article.

Accelerated Pull-Down Rate

Television standards and proper synchronization require transmission of 60 fields (30 interlaced frames) per second. Since motion picture film is made for projection at 24 frames per second, means have been provided for conversion from the one rate to the other. This is done in the TP-16A by scanning the first frame twice, the second frame three times, the third twice, the fourth three times, and so on. The average rate, then, is 2½ scannings per frame, which, at a film speed of 24 frames per second, provides 60 scanned fields per second.

To successfully employ the 2-3-2-3 scanning sequence, the pull-down time for each frame must be shorter than that employed in standard projectors. The pull-down interval in a standard projector is about one-sixth the total "frame cycle." If this interval were used for television projection, alternate pull-downs would slightly overlap the scanning cycle and would cause annoying travel-ghosts.

To avoid this, the spur gears ordinarily used in a projector have been replaced in the TP-16A with a set of elliptical gears, which cause the claw mechanism to travel about 50 per cent faster in the downward direction. As a result the pull-down time is reduced to about one-eighth the "frame cycle," the film remains in the film gate for seven-eighths of the cycle, and the pull-down cannot coincide with the projection interval.

The optical projection system of the TP-16A consists of a 1000-watt air-blast-cooled incandescent lamp, a silver-coated Pyrex glass reflector, a large two-element aspheric condenser lens, and a coated F:2 projection lens. This system provides plenty of illumination on the mosaic of the camera pickup tube and is much simpler than systems using switched or pulsed light sources.

A number of unusual features are incorporated in the sound system of the new television projector, where the density or area variations of the film sound track are translated into electrical impulses, amplified, and used to modulate the sound portion of the television transmitter.

One of these features is the use of radio-frequency voltage on the exciter lamp filament. This type of power source insures a constant beam of light which prevents hum and noise from being introduced by the lamp itself. To insure permanently accurate alignment, the exciter lamp mounting the sound carriage are die-cast in one piece.

Another feature of the projector is the use of the well-known RCA-developed rotary stabilizer on the sound drive. This device maintains smooth, uniform film speed for sound take-off, and insures sound reproduction at virtually the originally recorded pitch.

Precise Sync Necessary

A fundamental requirement of a television film projector is that it must synchronize with the television system. This is assured in the TP-16A by using a common source of power for both the television synchronizing generator, which drives the scanning beam in the camera pickup tube, and for the motor which drives the projector shutter. To make sure that the shutter will be in-step at all times, the motor used is a speciallly wound three-phase synchronous type with D.C. field excitation, always "locking" in phase at exactly 3600 r.p.m.

Controls mounted on the projector provide maximum flexibility of operation for the unit. These include stand-by, emergency run, start, stop, and remote controls. When the stand-by control is operated, low voltage is applied to the projection lamp, the blower motor operates, and the pre-amplifier is warmed, as this is the normal warm-up position.

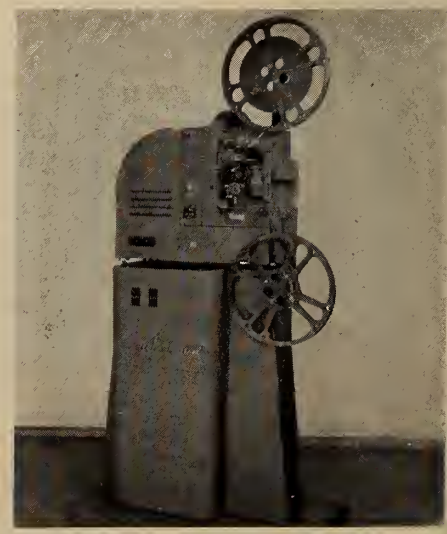
When the remote switch is closed, "start" and "stop" controls at the remote location may be used to control operation. These circuits operate through relays and a master contactor mounted on the pedestal of the projector. Also mounted on the pedestal are 115-volt, single-phase, and 220-volt, three-phase, circuit breakers.

The TP-16A projector is entirely self-contained and, with the exception of the film feed arrangement, is entirely enclosed. The projector is mounted on a heavy cast-base frame. This frame in turn is mounted by means of leveling screws on a lightweight pedestal, which provides a convenient place for mounting the controls and field supply for the special, three-phase motor.

Questions stemming from this discussion of the difference between present theatre projection standards and those applying to video are invited.

RCA 16-mm VIDEO FILM PROJECTOR

This unit will facilitate the use of newsreels, short film subjects, and film commercials, contributing to low-cost television programming. It projects regular 16-mm motion pictures onto the light-sensitive element of the electronic pick-up tube in a television camera.



The "C&C" SIX-PHASE RECTIFIER Is YEARS AHEAD

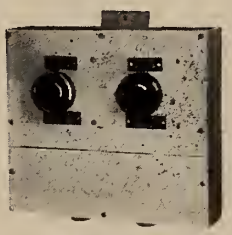


TYPE H28-70
SIX PHASE
RECTIFIER

MOTION Picture projection has taken a stride forward! Brilliant, flicker-free light can now be obtained from rectified A. C. power. By doubling the number of impulses per second, disturbing ripples are eliminated. Experts in the field—many leading studios and theatre circuits — already know the superiority of the "C & C" Six-phase rectifier.* The industry is rapidly moving forward with Six-phase rectification. You too can improve the performance of your lamps. Write for additional information today!

* The type H28-70 is a **Six-phase** full-wave rectifier operating from Standard 3-phase lines. It employs the Magnesium-Copper Sulphide metallic rectifying stacks which proved so remarkably successful during wartime. This is ascribed to their ability to withstand high temperatures, overloads and mechanical abuse—The H28-70 is rated 70 amperes. It is especially designed for the new 7- and 8-mm carbons. Also well suited for the 6- and 7-mm trim. Note that **6-phase full-wave** is equivalent to 12-phase half-wave rectification which heretofore has only been available for large power installations. H28-70 is approved by Underwriters' Laboratories.

THE TYPE C TRANSFER SWITCH



Another "C & C" contribution to better performance and simpler installation. All wiring is prearranged and standardized. Switching from one rectifier to another during performance—should it ever be necessary — is instant and convenient.



TYPE 6367 "Start-Stop" Switch for remote control of rectifier.

For the most beautiful light on your screen, put Six-phase power into your lamps.

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Gentlemen:

Please send me a copy of your Six-phase Arc Lamp Rectifier Catalog.

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Specialists in Rectifiers for More Than 15 Years

Record Papers Program for S.M.P.E. Chicago Meeting

WITH a record total of 71 papers covering a wide range of advances in motion picture equipment and techniques already listed on the tentative program, the 61st Semi-Annual Convention of the Society of Motion Picture Engineers is all set for one of its greatest meetings at the Drake Hotel, Chicago, April 21-25.

Testifying to the increasing importance of the so-called sub-standard field in the scheme of things motion picture is the fact that approximately half of the scheduled papers and demonstrations are related to uses of 8- and 16-mm films, not a few of which have particularly provocative titles. Television will also be accorded extended treatment.

Of special importance is the fact that many manufacturers will avail themselves of the generous facilities provided to exhibit the very equipments which will be described in papers during the technical papers sessions.

Bill Kunzmann, convention arrangements chairman, has arranged for numerous social activities for convention registrants, including special functions for the lady guests. As usual, highlights of the meeting will be the opening-day get-together luncheon and, later, the informal dinner-dance.

Abstracts of Papers

Abstracts of a majority of the papers to be presented are appended hereto. It is desired to stress the fact that these abstracts are contributed by the authors of the various papers, and the statements therein should not be attributed to I. P.

SYNCHRONIZED 16-MM SOUND AND PICTURE FOR PROJECTION AT 16 FRAMES PER SECOND

By *George E. H. Hanson*
Warner Bros. Pictures, Inc.

Describing a method of re-recording 35-mm sound track to obtain a 16-mm track which will reproduce synchronously with a 16-mm picture projected at 16 frames per second. The only necessary modification of a standard re-recording channel to perform this operation is the substitution of an 1800 r.p.m. synchronous motor for the standard 1200 r.p.m. motor on one 35-mm soundhead.

SOUND-ON-DISC WITH 8-MM FILM

By *Lloyd Thompson*
Calvin Co., Kansas City, Mo.

The first commercial 8-mm sound projector has been introduced with the sound on a disc running at 33-1/3 r.p.m. An automatic synchronization method is used, and the turntable and the projector are not mechanically connected. 8-mm sound films for use with the machine are available. A demonstration was given.

FLASHTUBES—A POTENTIAL ILLUMINANT FOR MOTION PICTURE PHOTOGRAPHY?

By *F. E. Carlson*
General Electric Company

This is a preliminary appraisal of Flashtubes for motion picture studio photography. Such sources have been widely and successfully used for still photography for several years, where their short duration and high efficiency have been important factors in its favor. Most of these advantages, while equally important in the film studio, cannot necessarily be realized to the same degree in this field. Furthermore, many problems, the magnitude of which cannot be predicted at this time, appear inevitable and will require thorough analysis before a final evaluation is possible.

ENGINEERING ASPECTS OF AMATEUR PROJECTION EQUIPMENT FOR THE MASS MARKET

By *Percival H. Case*
Excel Movie Products, Chicago, Ill.

The mass market is necessarily a price market, since only in the low price brackets are sufficient purchasers found to warrant large volume production.

Low cost can be achieved while high relative value is maintained, only if the engineering adheres carefully to these fundamentals: (a) elimination of unnecessary features; (b) determination of acceptable minimum levels of performance; (c) providing attractive external appearance; (d) design of parts for mass production by proper selection of dimensional tolerances, careful tooling to insure such tolerances, and the use of suitable materials; (e) establishing economical assembly line procedure by considering assembly problems from the inception of parts design, by providing accurate assembly fixtures and by maintaining adequate process inspection throughout manufacture.

PORTABLE 16-MM SOUND PROJECTOR

By *H. H. Wilson*
Ampro Corporation, Chicago, Ill.

This is an analysis of some of the problems encountered in the design and production of a quality 16-mm sound projector designed to meet the requirements of the school, church and industrial fields.

The problems of screen illumination, sound reproduction, operational controls, film handling and film protection, noise factors, styling, maintenance and weight limitations will be discussed. Manufacturing problems and their solution on the basis of mass production will be considered.

TELEVISION STUDIO LIGHTING

By *William C. Eddy*
Director of Television, WBKB, Chicago

The three basic laws of television, *i.e.*, mobility, flexibility, and instaneity, are best represented in the requirements for a satisfactory lighting system for the video medium.

While the fundamentals of lighting techniques for the stage and for motion pictures remain unchanged, the presently accepted system of remote control overhead lighting in television relegates to one operator both

(*Continued on page* 30)

Background of American Trade Unions

By JOHN P. FREY
President, Metal Trades Department, A. F. of L.

V.

BEFORE examining further into the craft guilds let us endeavor to picture a medieval craftsman. He had served a long apprenticeship, *generally seven years*. When this had been completed he traveled from place to place, learning more and more of the "arts and mysteries" of his craft. For a number of years he became what his name implied, a journeyman, a mechanic on his travels. When this period had passed he looked around for some permanent place to live.

Here, as far as he could, he made an outstanding example of his craft skill, his masterpiece, so that prospective customers could see a sample of his craftsmanship. He set himself up as a master craftsman.

As an apprentice he had learned the rudiments of his craft's guild, its traditions and its laws. Then its "mysteries" had been made known to him when the guild initiated him as a journeyman. He became familiar with the guild's problems, the constant effort of the nobles, the city corporations and the merchant guilds to interfere with the craftsmen's customs, their rules and regulations, their wages, the prices charged for what they produced. He learned that these influences worked to favor a non-guild craftsman whenever possible. He was therefore as strongly opposed to the non-member as are our craftsmen of today.

Guilds' Royal Charters

To protect himself in his right to self-government within the guild, the practice of securing royal charters was established, so that in many cities no workman could work at his craft unless he was a member in good standing of his guild. Some of these charters went back to the eleventh century.

(*Continued on page* 28)

Complete Projection Data Charts

By ROBERT ALLEN MITCHELL

1. Carbon Arc Circuit Data

Herewith the first of a series of seven articles by a practical projectionist presenting data forms covering complete visual and sound equipment from projection room to screen, and including auxiliary units, together with detailed instructions for their use so as to realize maximum benefit therefrom.

THE projectionist is called upon to control and adjust a multiplicity of factors in order to recreate pleasingly the aesthetic and dramatic values imprisoned on the film. To attain proficiency in his work he must not only understand the optical, mechanical, and electrical principles upon which his equipment operates, but he must also know how well the various units of the equipment are matched or adjusted to perform their functions. This calls for accurate information regarding the ratings and other characteristics of the equipment.

The conscientious projectionist does not rely on guesswork whenever it is possible to secure trustworthy information. He realizes that a thorough knowledge of his equipment is his most important defense against breakdowns or the occurrence of commoner projection faults. He carries many of the details in his mind, but those that he has taken considerable time and trouble to ascertain will probably be jotted down in a notebook. The information is ready to serve him whenever changes are contemplated or when unsatisfactory conditions demand correction.

Accompanying this article are two alternative data forms in which are tabulated the most important points of generator-arc and rectifier-arc circuits. Data forms to be given with subsequent articles will cover the complete projection equipment.

The data sheets, when filled out to a reasonable degree of completeness, will provide a comprehensive and accurate description of the individual installation. They are not inventories; they are the projectionist's notes for reference purposes. They will reveal whether or not the equipment is operating at peak efficiency. They furnish material for discussion with the management when improvements are being considered. They will provide the answer to most of the questions relief men and assistants are likely to ask.

Form 1A is intended for theatres where generators are used; Form 1B for rectifier installations.

Fill out the forms in pencil, *not* in ink, as changes may be desired later. Enter the most obvious and easily determined facts first; then go after the details.

FORM 1A: GENERATOR-ARC

SECTIONS 1, 2, and 3 require no special comment. Much of the information is probably given on the serial-number plates. If in doubt about any item, write to the manufacturer.

4. FIELD RHEOSTATS. The capacity in amperes and the total resistance in ohms should be marked on the rheostats. If not, skip these items. They are not important unless makeshift equipment is used, in which case an investigation should be made.

5. A.C. POWER CONTROL. Give the make and model of all items under "Control Cabinet & Starter."

6. BALLAST RESISTANCES. *To determine the ohmic resistance of a ballast rheostat:*

METHOD 1. Strike the arc on the proper machine. In about a minute, when the arc is burning normally, apply a voltmeter across the terminals of the resistance unit. Take the reading (ballast voltage-drop), then use the following rule or formula:

RULE. *To find the resistance of the ballast in ohms,* divide the ballast-drop in volts by the current in amperes.

FORMULA: e_b is the ballast-drop; I represents amperes: $R_b = \frac{e_b}{I}$

METHOD 2. The arc voltage-drop needed with this method will be considered under Section 7; line voltage-drop under Section 8.

RULE: *To find resistance of the ballast in ohms,* add the arc-drop to the line-drop. Subtract the sum from the voltage at the generator output terminals. Divide the difference by the current in amperes.

FORMULA: E is the generator voltage; e_a is the arc drop; e_1 is the line drop:

$$R_b = \frac{E - [e_a + e_1]}{I}$$

[*NOTE:* When two or more methods are given, use whichever is the most convenient, or use one as a check against the other. It will be noted that calculations are given in the form of *rules*, and also as *formulae*. The formula concisely states in appropriate symbols what the rule states in words. A formula, like a rule, is merely a set of directions for performing arithmetical operations. Use whichever you prefer, the rules or the formulae.]

To determine the ballast voltage-drop:

METHOD 1. Strike the arc. In about a minute, when the arc is burning normally, apply a voltmeter across the terminals of the resistance unit. The reading is the ballast voltage-drop.

METHOD 2.

RULE: *To find the ballast-drop* multiply the current in amperes by the ballast resistance in ohms.

FORMULA: R_b is the ballast resistance: $e_b = IR_b$

7. ARC POWER. *To determine the voltage-drop at the arc:*

METHOD 1. Strike the arc. When the arc is burning normally apply a voltmeter across the arc lamp switch. The reading will be the arc-drop. Try this with all projectors. If the arc-drop seems abnormally high or low on some machines, make a note of it under "Remarks." A difference of only 2 or 3 volts is unimportant.

METHOD 2. (The line voltage-drop needed with this method will be considered under Section 8.)

RULE: *To find the arc-drop* add the ballast drop to the line drop. Subtract

B & S GAUGE WIRE TABLE

B & S GAUGE	AREA IN CIRC. MILS	RUBBER INSULATED, AMPS. CAPACITY
0000	211,600	200
000	167,800	175
00	133,100	150
0	105,500	125
1	83,690	100
2	66,370	90
3	52,630	80
4	41,740	70
5	33,100	55
6	26,250	50
8	16,510	35
10	10,380	25
12	6,530	20
14	4,107	15
16	2,583	6
18	1,624	3

FORM 1A: GENERATOR-ARC CIRCUIT DATA

Theatre ..... Date .....
City ..... Revised .....
State ....
Theatre Circuit ..... Chief Projectionist

1. MOTOR-GENERATOR SETS

Make & Model .....
Number of sets .....
Serial Nos. .....
.....
If more than one set, how many are used for each arc at one time? .....
If more than one set, how many arcs supplied by each set? .....
If two or more sets are used to supply same arc at same time, how interconnected? .....
.....
Remarks .....
.....
.....

2. MOTORS

H.P. .....
Volts .....
Cycles .....
Phase .....
Speed .....
If separate from generators, make, model, and serial Nos. .....
.....
.....
Remarks .....
.....
.....

3. GENERATORS

Full output voltage .....
Output voltage used .....
Capacity, kilowatts .....
Speed .....
Number & type of brushes .....
.....
If separate from motors, make, model and serial Nos. .....
.....
.....
Remarks .....
.....
.....

4. FIELD RHEOSTATS

Make & model .....
Number of rheostats per generator ....
Capacity, amperes .....
Resistance range .....
Number of settings .....
Normal setting .....
Where located .....
Remarks .....
.....
.....

5. A.C. POWER CONTROL

Main switch: Type .....
Where located .....
Fuses: Type .....
Rating .....
Where located .....
Circuit breakers: Type .....
Rating .....
Where located .....
Control cabinet & starter:
Control box .....
Starter .....
Relay switch .....
Remarks .....
.....
.....

6. BALLAST RESISTANCES

Make & model .....
Number of resistances .....
Where more than one is used as a unit, number per circuit, specifications, and how connected .....
.....
.....
Resistance of one unit .....
Ballast voltage-drop .....
Capacity, amperes .....
Remarks .....
.....
.....

7. ARC POWER

Arc voltage (drop) .....
Arc resistance .....
Arc current .....
Remarks .....
.....
.....

8. TRANSMISSION LINE

Length of "run" .....
How many power wires from generator room to booth .....
B & S gauge of wire .....
Type of cable .....
Line resistance per circuit .....
Line voltage-drop per circuit .....
Main switch: Type .....
Where located .....
Fuses: Type .....
Rating .....
Where located .....
Circuit breakers: Type .....
Rating .....
Where located .....
Remarks .....
.....
.....

9. METERS

Line (A.C.) voltmeters:
Make & model .....
Number of voltmeters .....
Capacity, volts .....
Normal reading .....
How connected .....
Where located .....
Generator or arc voltmeters:
Make & model .....
Number of voltmeters .....
Capacity, volts .....
Normal reading .....
How connected .....
Where located .....
Ammeters:
Make & model .....
Number of ammeters .....
Capacity, amps. .....
Normal reading .....
How connected .....
Where located .....
Remarks .....
.....
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10. EMERGENCY EQUIPMENT

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the sum from the voltage at the generator

FORMULA: $e_a = E - [e_b + e_1]$

METHOD 3.

RULE: *To find the arc-drop* multiply the current in amperes by the resistance of the arc in ohms.

FORMULA: R_a is the ohmic resistance of the arc: $e_a = IR_a$

To determine the ohmic resistance of the arc:

METHOD 1. (The line voltage-drop needed with this method will be considered under Section 8.)

RULE: *To find the arc resistance* add the ballast-drop to the line-drop. Subtract the sum from the generator voltage. Divide the difference by the current in amperes.

FORMULA: $R_a = \dfrac{E - [e_b + e_1]}{I}$

METHOD 2.

RULE: *To find the arc resistance* divide the arc-drop in volts by the current in amperes.

FORMULA: $R_a = \dfrac{e_a}{I}$

To determine the current at the arc: this value is the same as the current anywhere in the arc circuit. Practically every installation is equipped with one or more

FORM 1B: RECTIFIER-ARC CIRCUIT DATA

Theatre ..... Date .....
City ..... Revised .....
State ....
Theatre Circuit ..... Chief Projectionist

1. RECTIFIERS

Type .....
Make & model .....
Number of rectifiers .....
Serial Nos. .....
.....
If more than one rectifier, how many are used for each arc at one time? ....
If more than one rectifier, how many arcs supplied by each rectifier? .....
If two or more rectifiers are used to supply same arc at same time, how interconnected? .....
Full- or half-wave .....
Input voltage .....
Cycles .....
Phase .....
Full voltage output .....
Output voltage used .....
Capacity, kilowatts .....
Remarks .....
.....
.....

2A. TUBE RECTIFIERS

Specifications of transformers or chokes .....
Type of tubes .....
Type No. of tubes .....
Number per rectifier .....
Filament voltage .....
Filament current .....
Plate voltage .....
Plate current .....
Specifications of filter apparatus .....
.....
Remarks .....
.....
.....

2B. COPPER-OXIDE RECTIFIERS

Specifications of transformers or chokes .....
Type of rectox units .....
.....
Number per rectifier .....
Blower motors and mercoid switches. (See under A.C. Power Control.)
Specifications of filter apparatus .....
.....
Remarks .....
.....
.....

3. A.C. POWER CONTROL

Main switch: Type .....
Where located .....
Fuses: Type .....
Rating .....
Where located .....
Circuit breakers: Type .....
Rating .....
Where located .....
Control cabinet & starter: (If blower-controlled mercoid switches are used, omit this section) .....
Control box .....
Starter .....
Relay switch .....
Blower & starter: (If electromagnetic starter is used, omit this section)
Blower motors: Number per rectifier .....
Make & model .....
Serial Nos. .....
.....
Mercoid switches: Number per rectifier .....
Type .....
Relay switch .....
Remarks .....
.....
.....

4. BALLAST RESISTANCES

Make & model .....
Number of resistances .....
Where more than one is used as a unit, number per circuit, specifications, and how connected .....
.....
.....
Resistance of one unit .....
Ballast voltage-drop .....
Capacity, amperes .....
Remarks .....
.....
.....

5. ARC POWER

Arc voltage (drop) .....
Arc resistance .....
Arc current .....
Remarks .....
.....
.....

6. TRANSMISSION LINE

Length of "run" .....
How many power wires from rectifier room to booth .....
B & S gauge of wire .....
Type of cable .....
Line resistance per circuit .....
Line voltage-drop per circuit .....
Main switch: Type .....
Where located .....
Fuses: Type .....
Rating .....
Where located .....
Circuit breakers: Type .....
Rating .....
Where located .....
Remarks .....
.....
.....

7. METERS

Line (A.C.) voltmeters:
Make & model .....
Number of voltmeters .....
Capacity, volts .....
Normal reading .....
How connected .....
Where located .....
Output or arc voltmeters:
Make & model .....
Number of voltmeters .....
Capacity, volts .....
Normal reading .....
How connected .....
Where located .....
Ammeters:
Make & model .....
Number of ammeters .....
Capacity, amps. .....
Normal reading .....
How connected .....
Where located .....
Remarks .....
.....
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8. EMERGENCY EQUIPMENT

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arc-circuit ammeters. The reading of the ammeter when one lamp is burning indicates the normal current in amperes. Ammeters are connected in series with the circuit the current of which they are to measure.

The current in an arc circuit may be calculated by dividing the generator voltage by the sum of the resistances of the arc, the ballast, and the line. Calculation of current is not recommended, however. It is better to measure it directly with an accurate meter.

8. TRANSMISSION LINE. By "length of run" is meant the one-way distance of the arc circuit from generator to projectors. It is expressed in feet. This may be measured directly, or it may be calculated.

[*NOTE:* To use the calculation methods a table of B & S wire sizes with their equivalents in circular mils must be available. A circular mil is a unit for measuring area. Such a table is given in this article.]

METHOD 1. Direct measurement. If

(*Continued on page* 27)

IN THE SPOTLIGHT



By *HARRY SHERMAN*

TWENTY-FIVE years ago this month, in an All-American Day address in Cincinnati, Ohio, Theodore Roosevelt, Jr., Assistant Secretary of the Navy, strongly defended the trade union movement against vigorous attacks by anti-unionists. In reply to charges of radicalism made against organized labor, he declared:

"The union is forced to fight as strenuously for self-preservation as is capital. It would never do to allow either capital or labor to usurp industry, but a balance of power will make for the peace of all.

"Our family has always backed the labor movement, and it was my father who best expressed to me the reasons for supporting the unions. He said: 'If I were a factory employe, a laborer on the railroads, or a wage-earner of any sort, I would undoubtedly join the union of my trade. If I were opposed to the policy of the union, I would join it for no other reason than to help rectify the mistakes. If I took exceptions to a dishonest leader, I would join that union to help to remove him. In short, I believe in the union, and I believe that all men who are benefited by the union are morally bound to help to the extent of their power in the common interest advanced by the union.'"

● John Nickel, member of Pittsburgh Local 171, was elected to the executive board of the Pittsburgh Union Label Council.

● My, my, but we old-timers are certainly getting on! Now it is our good friend, Bill Covert, Toronto Local 173 business agent and I. A. 2nd vice-president, who has joined the ranks of grandpops with the advent several weeks ago of his first grandchild. Welcome to the fold, Bill; yours truly recently became a granddad for the second time.

● We recently learned of a very interesting case now confronting a small I. A. Local Union. About four years ago this Local accepted an apprentice member, who shortly thereafter requested that a ballot be taken on his application for journeyman membership. Four such ballots were taken and on each ballot his application was rejected.

In accordance with the I. A. Constitution and By-Laws his affiliation with the Local and the I. A. terminated upon his fourth rejection.. Not satisfied, however, this former apprentice filed a bill of complaint against the Local, stating that he was denied a voice and vote in the Local, and demanded that his apprentice membership be restored to him.

From last reports reaching these columns, the case is now pending and the court's final decision has not yet been handed down. We will publish this decision as soon as it is rendered, for we believe there are other I. A. Locals faced with similar problems.

● Our congratulations to Bill Thompson, popular business agent for Pittsburgh Local 171, upon his election to the post of secretary of the 4th District, succeeding the late Charles Brunner.

● Bob LaVezzi of the LaVezzi Machine Works, Chicago, is the proud daddy of a baby girl. We intend to collect the customary cigar usually handed out on such eventful occasions when we attend the SMPE convention in Chicago the end of this month.

● "Never say die" must be a favorite slogan for Harold DeLarm, business agent for Local 675, Eugene, Ore. For many years he has tried—unsuccessfully to date—to have the Oregon State Legislature enact a bill that would force exhibitors to install proper sanitary facilities in projection rooms. DeLarm, however, refuses to accept defeat and is determined to continue his fight.

Chicago Local 110 and Detroit Local 199 overcame bitter exhibitor opposition to such a plan by making provisions in their contracts for several 15-minute rest periods each day for projectionists. Rather than face the possibility of darkening their theatres several times a day to allow for these rest periods, the exhibitors quickly complied with the unions' demands for proper projection room sanitation and ventilation facilities and lost little time in making the necessary installations.

● Recent out-of-town visitors to the offices of I. P. included the following officers of Boston Local 182: Joe Nuzzolo, president; Walter Diehl, business agent, and Harold A. Kaitz, secretary. The boys came to New York on official business with the General Office.

Diehl reminded us of our failure to mention last month that Edward Schindler was among the Local 182 members awarded diamond-studded service pins by Loew's, Inc. The oversight was unintentional.

● A "welcome home" dinner was tendered Oscar Olson, former business agent of Milwaukee Local 164. Olson resigned from office several years ago because of ill health and took up residence on the West Coast. His return to Milwaukee was hailed by his many friends in and out of the union.

● We are happy to report that Charles Beckman, financial secretary of New York Local 306, has fully recovered from the illness that caused him to take a leave of absence for several months, and has once more resumed his official duties.

● Bruce Steinmetz, member of Local 213, Great Falls, Mont., was elected president of the Cascade County Trades and Labor Assembly for the 15th consecutive year.

● We have been informed that largely because of this department's insistence that projectionists be paid time-and-a-half and double time for working week-ends and holidays in theatres where admission prices are boosted on those days, a bill was introduced in the Pennsylvania Legis-

"I give preference to unionists because I am convinced that the man who gives a considerable portion of his time each week and a considerable portion of his earnings each week to try and improve the condition in which he lives, is justly entitled to more consideration than the man who remains outside and will not give a portion of his time and fraction of his money to better the conditions of himself and those who are dependent on his earnings."

JUDGE CUSSE, of the Australian Arbitration Court, April 1922.

lature prohibiting exhibitors from increasing their admission prices on such days. We should like to see such a bill passed, for, as we have pointed out so many times, it is high time exhibitors realized that a holiday is just as important to the projectionist as it is to workers in other industries. If a man is willing to give up his holiday to help increase his employer's profits, he should be adequately compensated therefor.

● Claude (Bud) Hubbard, business agent of Minneapolis Local 219 for many years, has resigned from office to take a well-earned vacation.

● Members of Baltimore Local 181 presented a gold watch to William George, their retiring vice-president. George held office in the Local for over 35 years and decided it was time to quit and let somebody else carry on.

● The death several months ago of Toby Abramowitz, who was a member of Local 384, Hudson County, N. J., for over 25 years, brought to light a condition existing in many motion picture theatres throughout the country. Toby was taken ill while working in a coop that passed for a projection room in one of the big circuit houses in his Local's jurisdiction.

It was necessary to rush him to the hospital, and since the only means of entrance or exit from this so-called projection room was through a trap-door in the floor, Toby had to be lifted out by a "block and falls." Needless to say, when he finally reached the hospital much time had elapsed, and Toby failed to respond to treatment.

We believe it to be the function of Local Union officials to use all means in their power to force theatre owners to equip their projection rooms with adequate entrances and exits. No man should be expected to work in a booby-trap such as the one mentioned above.

Millions of dollars in profits pour into the tills of motion picture theatres—independently-owned and circuit houses—and fortunes are spent annually in beautifying and improving these theatres. According to the 1947 Film Daily Year Book, over $65,000,000 was spent by the motion picture industry in 1946 for advertising only. There seems to be plenty of money floating around for theatre decorations, *etc.*, but very little for the comfort and safety of the man in the projection room, the man upon whom, ironically enough, the exhibitor depends for the proper showing of his wares.

● Thad Barrows, former president of Boston Local 182, stopped at the offices of I. P. on his way home from a month's vacation at Sarasota, Fla. Thad said he spent his vacation *training* with the Boston Red Sox, although we believe that he took his training sitting on the bench. He looked fit as a fiddle and was anxious to get back to his job at the Metropolitan Theatre, where new Simplex projectors were installed during his absence.

● At a State Federation Convention several years ago, the New York Local 306 delegation proposed that steps be taken to lower the security law age limit from 65 to 60 years. This proposal was passed by the Federation at the time, but nothing further was done about the matter.

We were interested to learn, therefore, that Congressman Homer D. Angell of Oregon recently introduced such a bill in Congress, applicable to both men and women.

● E. L. Gullatt, secretary-treasurer of Local 568, Columbus, Ga., sent us a very interesting poem written by one of his members, Wm. O. Jeffries, on the fate that awaits the projectionist when he is too old to carry on with his work. We regret that lack of space does not permit its reproduction in these columns, but we commend Brother Jeffries for his sentiments.

I. A. Elections

LOCAL 163, LOUISVILLE, KY.

Chester Demaree, *pres.*; C. H. Young, *vice-pres.*; Bob Hulett, *rec.-sec.*; E. F. Williams, *fin.-sec.*; J. P. Flaherty, *bus. agent*; John Dahl, *trustee*. Newly elected officers were installed by A. A. Ansback, retiring vice-pres.

LOCAL 165, HOLLYWOOD, CALIF.

Walter R. McCormick, *pres.*; James Brigham, *vice-pres.*; Jas. J. Eddy, *bus. rep.*; George J. Flaherty, Richard B. Frisbie, Charles Groman, Harold Masser, Harold Sailor, *executive board*; James Brigham, Jas. J. Eddy, Richard B. Frisbie, Walter R. McCormick, Harold C. Roddan, *del. to Central Labor Council*; Jas. J. Eddy, *del. to State Federation of Labor Convention* and *Calif. State Theatrical Federation*.

LOCAL 225, ATLANTA, GA.

William Schinder, *pres.*; Flynn Haygood, *vice-pres.*; Bruce Self, *rec.-sec.*; Martin Morris, *fin.-sec.*, Jake Pries, *bus. agent*.

LOCAL 334, NEW BEDFORD, MASS.

Edward Patrick, *pres.*; George McLelland, *vice-pres.*; Walter Smith, *rec.-sec.*; Will Robidoux, *fin.-sec.*; Edward Patrick, *bus. agent*; Al Davis, *ass't bus. agent*; George McLelland, Edw. Patrick, Joe Thiberge, Will Robidoux, Lucien Cyr, *executive board*.

LOCAL 439, NEW LONDON, CONN.

Byron McLellan, *pres.*; W. W. Lucas, *vice-pres.*; William F. Totten, *rec.-sec.*; William A. Reed, *fin.-sec.-treas.*; Fred Nowell, *bus. agent*; Salvatore Patti, Irwin Dawley, John Kane, *trustees*.

LOCAL 585, ALLENTOWN, PENNA.

Pete Wister, *pres.*; Russ Smith, *vice-pres.*; Norman Schultz, *rec.-sec.*; Harry Hohl, *fin.-sec.*; Richard Hartman, *treas.*; Roy Rau, *bus. agent*.

LOCAL 661, READING, PENNA.

H. M. Young, *pres.*; Bert Mellinger, *vice-pres.*; Al Gift, *rec.-sec.*; Roy Tolbert, *fin.-sec.*; Sam Saylor, *treas.*; Tom Harford, *bus. agent*; Horace Good, Lew Yost, *executive board*.

25 Years Ago—April 1922

● Local Unions received their credentials for the 26th I. A. Convention scheduled to be held in Cincinnati, Ohio. . . . The Chicago Federation of Labor went on record as favoring the "One Big Union." Opposition was voiced by O. F. Nelson, vice-president of the Federation. . . . Gus Hill reported in favor of sending out road shows at a top of $2. . . . According to an international commercial journal, the German worker of the better paid class actually earned less than the Chinese coolie, who had always been considered the poorest paid worker in the world. . . . The statutes of the recently formed Argentine Regional Labor Union openly advocated insurrection and social revolution against the capitalists. . . . The United Mine Workers received their first strike call. . . . A. F. of L. President Sam Gompers informed the American Legion that organized labor would help the Legion's campaign to relieve unemployment among veterans of World War I. . . . Kentucky Circuit Judge Caldwell enjoined State troop officials from interfering with strikers. . . . E. H. Sothern, the noted Shakespearean actor, complained to a Montreal audience of the "humiliation" he suffered at the hands of the theatre management. It developed that Mr. Sothern was most reluctant to pay the stagehands for overtime worked on his production, hence his peeve. . . . The Columbia and American burlesque circuits were still feuding. . . . New York Local No. 1 held its annual ball at the 71st Regiment Armory. . . . Congress refused the use of Federal funds to prosecute labor unions. . . . Will Hays cancelled the showing of all of Fatty Arbuckle's pictures.

● It seems as though Leon Burton, treasurer of Rochester, N. Y., Local 253, aims to beat all records as an office-holder. A charter member of Local 253, Leon served two terms as recording secretary from 1912 to 1918, when he was elected financial secretary-treasurer, a post he has held for the past 29 years. He is evidently trying to top the record of his dad, who was treasurer of the Machinists Union for over 33 years. Leon also holds membership in the 25-30 Club of New York City.

Drastic Missouri Safety Proposal

A bill requiring amusement places to provide a uniformed attendant, qualified and experienced in fire prevention, for every 1,000 spectators, has been introduced in the Missouri Legislature. Attendant would remain on duty throughout every performance, with violations made a misdemeanor.

The 'How' of Motion Picture Standards

The proposal, consideration, establishment and, occasionally, the withdrawal of motion picture film standards is not thoroughly understood by many practitioners in the art, thus engendering some confusion in the application of same. Here is an authoritative exposition of the "how" of this vitally important activity.

ALL American Standards on Motion Pictures developed by the motion picture industry are published officially for the industry by the American Standards Association. The procedure used in the past was somewhat involved, but has been simplified in the light of experience gained in standardization during the war and the preceding ten years.

At present, American Standards may be proposed by any competent individual, organization or industrial group, and it is expected that they will substantiate the claims that such new proposals are desirable. Safeguards are necessary, of course, to insure that the proposed standardization will not prejudice technical development, and the ASA procedure does this as well as make certain that anyone stating his opinions for or against any new proposal has an equal opportunity to be heard.

The withdrawal of existing standards is as carefully supervised as the preparation of new ones, and the same procedures are observed. An example is:

American Recommended Practice for Motion Picture Films, Theater Sound Fader Setting Instructions, Z22.32-1941,

which was officially approved for withdrawal by the ASA on March 7, 1947. Therefore, this standard is no longer valid and will not be considered as having industry sanction in the future.

Withdrawal of Standard

Sometime prior to 1941 the industry adopted the practice outlined in this standard, because at that time it was felt necessary to provide more than one type of recording for certain feature releases. Fader Setting Instructions to projectionists were inserted as a 15-frame strip of information located in the first 20 frames of the synchronizing leader of every release print. Prints which had normal equalization and recording characteristics, were marked "Regular" prints, while all other prints were either "Hi-Range" or "Lo-Range."

This practice has not been followed recently, and since none of the studios are now using it as outlined, the Research Council of the Academy of Motion Picture Arts and Sciences recommended to the ASA Sectional Committee on Motion Pictures, Z22, that it be withdrawn because continued existence of the published standard implied that the practice was still being observed.

The Sectional Committee voted in favor of the withdrawal and on December 31, 1946, the Secretary of that Committee asked the SMPE Board of Governors, which acts as its sponsor, to formally transmit this recommendation for final action by the ASA Standards Council. The Board did so; and official ASA approval of the withdrawal was announced on March 7, 1947.

At the present time, American Standards on Motion Pictures number from Z22.1 through Z22.54. Two of them, Z22.1 and Z22.32 have been officially withdrawn, leaving 52 valid standards on the current list. Of these, 26 were recently revised and published in the SMPE *Journal* for April and September, 1946. They are available in complete sets, bound in a heavy loose-leaf binder, from the General Offices of the Society in the Pennsylvania Hotel, New York, N. Y.

The remaining 26 standards are now in various stages of revision, and as they are completed and approved, will also be announced in the *Journal*. Individual notices of all new standards and revisions, as well as withdrawals, will be sent to all who have purchased standards binders, so that they may keep their records always current.

Present Standardization Procedure

A number of proposals for new motion picture standards have been submitted to the SMPE and are now being considered by various Committees. Reports of these committee's activities will give an indication of current standards work.

Recently adopted standardization procedure of the SMPE provides for publication of all new standards proposals in the *Journal*, in the form of a complete report outlining the past history of each new standard, the story of its progress through the committees, and a review of its ultimate effect on the industry. Following publication of this report in the *Journal*, and a suitable waiting period of about 60 days, each new standard will go to letter ballot of the Committee on Standards, if no unfavorable comments or criticisms are received.

If any serious objection to the new proposal has been raised as a result of this publication, however, the standard will go back to the Committee that prepared it, with appropriate instructions from the Engineering Vice-President and the Chairman of the Committee on Standards to assure that each serious comment receives thorough consideration. Then, following approval by the Committee on Standards, the customary standardization procedures are observed and the standard ultimately published.

Revised Projection Standards Validated by the ASA

SIX newly revised American standards on motion pictures, as submitted by the Standards Committee of the Society of Motion Picture Engineers, have been approved by the American Standards Association and represent another forward step in the present program of motion picture standardization. Three of these six new standards relate specifically to the projection process, details of which are appended hereto.

Projection Rooms and Lenses for Motion Picture Theatres ASA Z22.28—1946

1. Projection Lens Height. 1.1—The standard height from the floor to the center of the projection lens of a motion picture projector should be 48 inches.

2. Projection Angles. 2.1—The projection angle should not exceed 12 degrees.

3. Observation Port. 3.1—The observation port should be 12 inches wide and

Table showing screen sizes as approved by the American Standards Assocication.

Size No. of Screen	Picture Width (Feet)	Picture Height, Feet	Picture Height, Inches	Size No. of Screen	Picture Width (Feet)	Picture Height, Feet	Picture Height, Inches
8	8	6	0	25	25	18	9
9	9	6	9	26	26	19	6
10	10	7	6	27	27	20	3
11	11	8	3	28	28	21	0
12	12	9	0	29	29	21	9
13	13	9	9	30	30	22	6
14	14	10	6	31	31	23	3
15	15	11	3	32	32	24	0
16	16	12	0	33	33	24	9
17	17	12	9	34	34	25	6
18	18	13	6	35	35	26	3
19	19	14	3	36	36	27	0
20	20	15	0	37	37	27	9
21	21	15	9	38	38	28	6
22	22	16	6	39	39	29	3
23	23	17	3	40	40	30	0
24	24	18	0				

14 inches high, and the distance from the floor to the bottom of the openings shall be 48 inches. The bottom of the opening should be splayed 15 degrees downward. If the thickness of the projection room wall should exceed 12 inches, each side should be splayed 15 inches.

4. Projection Lens Mounting. 4.1—The projection lens should be so mounted that the light from all parts of the aperture shall traverse an uninterrupted part of the entire surface of the lens.

5. Projection Lens Focal Length. 5.1—The focal length of motion picture projection lenses should increase in ¼-inch steps up to 8 inches, and in ½-inch steps from 8 to 9 inches.

6. Projection Objectives, Focal Markings. 6.1—Projection objectives should have the equivalent focal length marked thereon in inches, quarters, and halves of an inch, or in decimals, with a plus (+) or minus (—) tolerance not to exceed 1 percent of the designated focal length also marked by proper sign following the figure.

Theatre Projection Screens

ASA Z22.29—1946

1. Screen Size. 1.1—Sizes of screen shall be in accordance with the table (Fig. 1).

2. Grommet Spacing. 2.1—The spacing of grommets shall be 6 inches. In rare instances, however, 12 inches will be permitted. The ratio of width to height of screens shall be 4 to 3.

3. Screen Placement. 3.1—The width of the screen should be equal to approximately 1/6 the distance from the screen to the rear seats of the auditorium. The distance between the front row of seats and the screen should be not less than 0.87 foot for each foot of screen width.

Screen Brightness: 35-mm Film

ASA Z22.39—1946

1. Screen Brightness. 1.1—The brightness of the center of a screen for viewing 35-mm motion pictures shall be $10\ ^{+4}_{-1}$ foot-lamberts when the projector is running with no film in the gate.

Specifications for all approved standards are available through the Society of Motion Picture Engineers, Hotel Pennsylvania, New York, 1, N. Y., which also provides a binder for holding the specially perforated standards sheets.

Technicolor Ups Footage Price

Technicolor Motion Picture Corp. has announced an increase in its price of one-half cent a linear foot on all 35-mm film delivered at its Hollywood plant, except three-strip and successive exposure negative. Also Technicolor is increasing the price of negative developing by one-half cent a linear foot.

Since Jan. 1, 1946, several increases in Technicolor's price have been made which in the aggregate have not covered by any means all the increased cost to Technicolor of labor and material, it is said. The occasion for the present increase is the increase of 11.17 per cent in labor rates which has been adopted retroactive to Jan. 1.



1. Don't fool yourself, sound trouble *could* make this happen at your theatre.


2. And result in lost receipts that bring on box-office blues.


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ALTEC'S NEW TEST FILM

(*Continued from page* 12)

of piano music. Particular attention was given to absence of flutter in recording and printing these sections, provided to permit aural check of flutter in reproducing equipment. Measurement with the TA-7421 Flutter Bridge will continue to be made with film prepared specifically for that purpose.

For years the only satisfactory method of producing high-grade test film required the costly process of toe recording, which meant that every foot of film had to pass through the recorder. Printing methods would not produce a test film of a uniformly high degree of quality. Recently, after years of research and development by Altec and the Research Council, methods were developed for producing calibrated test film of steady uniformly high quality through the controlled use of the printing process.

The major differences between this ED-35 test film and previous issues are, first, that it contains additional frequency sections in the low-end response, and, second, it is printed on acetate stock, which eliminates many complications involved in transporting the reels.



CONCENTRATED LIGHT SOURCES

(*Continued from page* 14)

per square mm. of the Suprex 7-mm./-8-mm. carbon arc.

Of course, as I. P. has reported previously, there are other limiting factors relative to the use of the W. U. lamp for motion picture projection work, including:

(1) variations in the spot during operation amounting to about 10% in brightness and total light emitted; (2) spectral characteristics, approximating those of "inkie" filament lamps; (3) a very low power factor evidenced by the 1.2 lumens-per-watt output as compared with the 31.2 lumen-per-watt output of the 7-mm./8-mm. Suprex carbon arc; and (4) the 90° light-distribution angle as contrasted with the 140° standard pickup angle of present mirror-reflector arcs.

Cloud's Blood Relation

Unwary technical editors may make obeisance before the W. U. lamp until their tummies ache, but it will require a whale of a lot of nose-rubbing to obliterate the precise markings made along the technological highway by Raymond T. Cloud. If the W. U. zirconium lamp be not of Cloud's immediate family, it is surely a blood-relation.

The aforementioned editors might well ponder the maxim that a prophet is not without honor save in his own country, because the means for "revolutionizing" motion picture lighting practices has been for a long time the property of a family within our own industry:

For the Cloud patents mentioned herein were long ago duly assigned to and still are the property of General Precision Equipment Corp., 92 Gold St., New York City.

Give to the Red Cross!

Experience during past campaigns has shown how vitally important the support of each member of the community is to the success of the annual Red Cross appeal. This year, the problems of thousands of veterans confront us. The morale of soldiers lying in military hospitals and veterans in veterans' hospitals must be maintained. So, too, must that of our occupation forces. Disaster relief and other year-round activities must be kept at full strength.

The American Red Cross, representing the people of the United States, carries out its vast program of mercy and community services through the generous support and cooperation of the people. How well Red Cross does this job depends on you! When you contribute to the Red Cross 1947 Fund, you become a member of a great working family—a family of American neighbors pledged to help each other in time of need.

PROJECTION DATA CHARTS

(*Continued from page 21*)

you know just where the cables run, well and good. But don't guess. Cables sometimes make strange detours inside walls and floors.

METHOD 2.

RULE: *To find the length of run* multiply the ohmic resistance of the transmission line by the cross-section area of one wire in circular mils. Divide the product by 21.4. The result is in feet.

FORMULA: R_1 is the line resistance in ohms; A is the cross-section area of one wire in circular mils: $L = \frac{R_1 A}{21.4}$

METHOD 3.

RULE: *To find the length of run* add the arc-drop to the ballast-drop. Subtract this sum from the generator voltage. Multiply this difference by the cross-section area of one wire in circular mils. Divide this product by 21.4 times the current in amperes. The result is in feet.

FORMULA: $L = \frac{A\,[E - [e_a + e_b]]}{21.4\ I}$

The B & S gauge of the wire is measured with a wire gauge. Every projectionist should have one. Under "Type of Cable" mention the type of insulation and sheathing, whether 1-wire or 2-wire, *etc.*

To determine the line resistance per arc lamp circuit in ohms: This can be measured directly by short-circuiting the ballast resistance and generator terminals with heavy wire and using dry batteries and test meters at the projector lamp switch, but this procedure is dangerous and is not recommended. Calculation is preferable in this case.

METHOD 1.

RULE: *To find the line resistance* multiply the length of the run in feet by 21.4. Divide the product by the cross-section area of the wire in circular mils.

FORMULA: L is the length of the run in feet: $R_1 = \frac{21.4\ L}{A}$

METHOD 2.

RULE: *To find the line resistance* divide the line-drop in volts by the current in amperes.

FORMULA: $R_1 = \frac{e_1}{I}$

To determine the line voltage-drop:

METHOD 1.

RULE: *To find the line-drop* multiply the length of the run in feet by the current in amperes, and multiply this product by 21.4. Divide this product by the cross-section area of one wire in circular mils.

FORMULA: $e_1 = \frac{21.4\ LI}{A}$

METHOD 2.

RULE: *To find the line-drop* add the arc-drop to the ballast-drop. Subtract the sum from the generator voltage.

FORMULA: $e_1 = E - [e_a + e_b]$

METHOD 3.

RULE: *To find the line-drop* multiply the current in amperes by the line resistance in ohms.

FORMULA: $e_1 = IR_1$

The remainder of the data form requires only ordinary observation for its completion.

FORM 1B: RECTIFIER-ARC

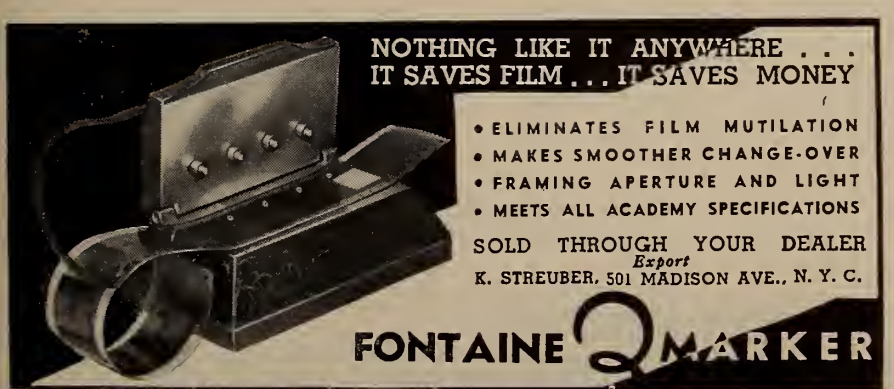
Sufficient instruction has been given in connection with FORM 1A to enable the projectionist to record rectifier data on FORM 1B. It may be mentioned that wiring diagrams of rectifier units should be in the possession of the projectionist. The manufacturer can supply these.

The sections from A.C. POWER CONTROL to the end are analogous to the corresponding sections in the generator form. The same methods and formulae may be used in determining the required information. If there are no ballast rheostats or similar voltage-reducers, the factors of ballast resistance and ballast drop should be omitted from the formulae.

[To be Continued]

PARAMOUNT'S 44 MILLIONS PROFIT

Doubling its 1945 profit, Paramount showed a *net* profit for the 53 weeks ending January 4 last of $44,040,000, after all charges including tax provision. This is equal to $5.92 per share on the common.





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Super-Snaplite lenses are stocked in focal lengths from 2" through 5" in ¼" steps. Speed of f/1.9 is maintained in all focal lengths from 2" through 4½". Other Snaplite lenses include the Series I and f/2.0 Series II. For complete details on all Snaplite lenses, get Bulletin 203 from your local supply dealer.



KOLLMORGEN Optical CORPORATION
2 Franklin Ave.
Brooklyn 11, N. Y.

AMERICAN TRADE UNIONS

(*Continued from page* 18)

The craftsman had a great pride in his skill, the knowledge of his craft's "arts and mysteries." He sensed that without him the knight could have no armor or weapons, the nobles could have no castles, and the church no cathedrals. He was the one who wove the cloth, or made it into garments. His skill produced the furniture for the homes and the trappings for the horses. City corporations depended upon him for public works. The craftsman was fully conscious of his importance without anyone telling him so. He had a pride, a fierce pride at times, in his skill.

In his guild he found a common brotherhood, the members of which, however they may have been divided over personalities, were thoroughly and determinedly united in defending and advancing the guild's welfare. The guild was his shield and buckler, his defender and his city of refuge.

He was a practical man who believed in resisting every attempt to encroach upon guild rights. The records show that at times he buckled on such weapons as he possessed and marched out to meet his opponents in militant mood, which the ancient chronicles of the city corporations termed unlawful assemblage, rioting and armed rebellion. Because he believed in organization and had found how to make it function effectively, he had learned to depend upon himself.

The guild craftsman occupied a position of far-reaching influence which he was conscious he had carved out for himself. Self-confident, he feared none except his Creator.

Fortunately, there are ample records of the guild period. Many records kept by guilds are available. The histories of cities contain frequent references to them. Students have collected a mass of documents from the medieval period, which give the story of guild development and activity in Europe and Great Britain.

Many volumes relative to the guilds can be found in our public libraries. We shall not endeavor to present a limited picture of the guilds by examining their history as the geologist examines rocks, one stratum upon the other. Instead, from their history separate instances of activities will be given so that we may see the guild in action.

Parallel Present Unions

We will find in their problems, their policies and in their conduct much which parallels the industrial picture of today. At times fierce jurisdictional disputes developed between them. The guild wardens have their counterpart in the local business agent whose methods of persuasion do not always depend upon the use of soft words.

Cities through their city corporation (board of aldermen or supervisors) enacted drastic anti-guild ordinances which the guilds resisted and generally with success. Merchant guilds and city corporations petitioned the King for relief, which he sometimes gave, but gave something which the guilds believed to be their rights. These they may have been forced to forego for a brief period, but they never surrendered.

The guilds were responsible organizations in more than one direction. They were held responsible for the workmanship of their members, for the guild was accepted as the guarantor of work which came up to the standard. Poor or indifferent work brought the member a discipline, which was frequently an official reprimand in the guild meeting or a fine. A glaring failure might even cost the guilty one his membership.

In doing work for the city corporation, the nobles or the religious orders, the guild was responsible for replacing all faulty workmanship. With craft pride there was the accompanying balance of craft responsibility. The guilds were able, because of their skill, which was so much required, to enjoy special privileges, but



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with these they were also compelled to assume responsibility.

Let us turn over a few pages of guild history to find some illuminating incidents.

The first reflects the custom of the burghers and the city corporations to place curbs upon the guilds, and the guilds' determination to maintain the self-made ordinances of their craft.

In 1261 A. D. a large number of craftsmen broke into the moat of London to hold an election for mayor. They elected a craftsman named Thomas Fitz Thomas, and what seems surprising, in view of the manner of his election, is that he served his term of office. What the good burghers of London thought of this there is no record, but they did submit. The craftsmen felt that they had established their right to have a definite voice in the election of mayor, and we hear no more of their troubles in the mayoralty campaigns which followed.

Militant Craftsmen Groups

Some sixty-five years previous to this election for mayor of London there had been serious rioting in that city. Some fifty thousand, so the annals state, challenged the authorities. Among them were a large number of craftsmen. The leader was William of the Long Beard, or William Fitz-Osbert, prominent as a member of his guild. His undisciplined forces, despite their courage and determination, could not resist the trained constabulary and the troops stationed in the barracks of the Tower of London. When his forces were disorganized and defeated, he took refuge in the tower of the Church of St. Mary-le-Bow in Cheapside. King Richard I issued a warrant for his arrest. Fire was set to the church to force Fitz-Osbert to come out.

He tried to escape, but was seen by a burgher and stabbed to death, avenging the burgher's father, who had been killed by the rebellion leader.

Apparently the cause for this demonstration was the usual one of taxes for the wars, which the guilds believed had been unfairly assessed. The armed resistance presented by the guilds, which in some aspects resembled a general strike, proved a failure but did not break the guild spirit or purpose to defend lustily their rights and interests. The convincing proof of this is the irregular assembly in the city's moat, some sixty-five years later, which elected one of their number as mayor who afterward was accepted as the chief magistrate by the burghers of London.

Throughout the first three hundred years or more of the craft guilds' existence there was continual conflict with the merchant guilds and the city corporations. Merchants and burghers were determined to control the crafts and regulate their ordinances.

There were in fact two causes for the conflict:

The craft guilds fixed the wages for their labor—the price for their product—in the same manner as the merchants fixed the price for their goods. The merchants desired to fix the crafts' rate of wages as well as the prices for what they sold to the craftsmen and other citizens.

The craftsmen, being thoroughly organized and refusing to work with non-members, possessed a power in municipal affairs which the merchants desired to control exclusively for their own personal welfare.

[To be Continued]

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SMPE PAPERS PROGRAM

(*Continued from page* 18)

the control and complete operation of the entire system. By flying the equipment from a unique gridiron, the studio floor is left clear for camera operation and stage settings, while from an overhead observation and control position the lighting control engineer can, at a flick of the finger, create and re-create at will the lighting effects required at a given moment.

Television studio lighting has in the past few years moved from the brute-force flat illumination problem imposed by low-sensitivity cameras to the more specific requirements of the extremely high sensitivity image-orthicon and orthicon chains. The need for high-intensity mercury vapor lamps and overall lighting levels of better than 1500 foot candles incident has given way to a super-flexible system capable of creating the artistic effects now required in studio work. The T. A. Tele-Lite, now installed in three post-war television studios, is typical of this new departure in remote-controlled illumination designed and tested in television broadcasting studios.

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A SURVEY OF 8-MM PROBLEMS

By *Robert E. Lewis*
Armour Research Foundation

The design and performance of 8-mm equipment is subject to the same basic principles as equipment for other film sizes, although it is necessary to interpret these principles more closely because of the high magnification and small frame size. Source size, lens aperture, steadiness, film resolution, and similar factors govern present-day and anticipated future limits of 8-mm as to dynamic resolution, illumination, and the possible addition of sound.

MAGNETIC SOUND WITH 8-MM PROJECTION

By *Marvin Camras*
Armour Research Foundation

A magnetic track deposited between the sprocket holes and edge of 8-mm film gives good quality sound which can be added to any ordinary 8-mm film. Modification of standard projectors for using this system are described. Performances for special speeds of 16, 18, and 24 frames per second are given.

DESIGN PROGRESS IN AN 8-MM PROJECTOR

By *T. J. Morgan*
Ampro Corporation, Chicago, Ill.

This paper outlines the design objectives involved in the production of a precision-made 8-mm projector, consideration being given to sales attractiveness in styling, distinctiveness and simplicity of appearance; problems in film handling, simplification of functions, minimizing operational controls, illumination efficiency as correlated with film movement and optics, temperature control, quality of projection, and production cost economy in parts and assemblies.

DUNNING ANIMATIC FILMS

By *Carroll H. Dunning*
Dunningcolor, Hollywood, Calif.

Animatic films are a novel method of injecting life and a sense of progression into the inanimate and static character of the present-day slide films used for instructional and advertising purposes.

DESIGN FACTORS IN 35-MM INTERMITTENT MECHANISMS

By *Arthur Hayek*
General Precision Laboratory, Inc.

Reducing pull-down time permits the use of smaller width shutter blades, thus increasing the screen brightness. If the pull-down time is reduced too much, however, the film will be subject to excessive acceleration, resulting in too much wear and shortened film life. Several methods of reducing

the pull-down time are discussed which will permit the use of smaller shutter blades and yet not subject the film to more stress than does the 4-slot Geneva intermittent now commonly used for 35-mm projection.

A NEW 35-MM PROJECTOR MECHANISM

By *Paul H. Berger*
Manufacturers Machine & Tool Co.

The 35-mm projector mechanism described in this paper embraces a new and different design on the proper presentation of the film and assertedly improves on all mechanisms currently used. The method used is new, yet simple and is designed to simplify the work of the projectionist. Other engineering characteristics are described and parts of the projector mechanism were exhibited.

A NEW SOUND SLIDEFILM PROJECTOR

By *J. McWilliams Stone*
Operadio Mfg. Co., St. Charles, Ill.

This paper presents electrical and mechanical details of a new sound slide-film projector intended for educational, point-of-sales selling, and visual training purposes. The apparatus was shown and demonstrated.

CONCAVE-CONVEX FIBREGLAS SCREEN

By *Otto Hehn*
Nu-Screen Corporation, N. Y. City

This paper tells of the new concave-convex Fibreglas motion picture screen, which is a scientifically and mathematically designed surface based on Helmoltz' teachings at the University of Berlin.

He suggested a revolutionary approach to the matter of improved screen images, which the conventional flat screen, it is held, has been unable to accomplish. The concave-convex Fibreglas screen assertedly eliminates distortion, hot spot, and improves sound and produces a more brilliant, clear picture, enhancing whatever illusion of depth is inherent on the projected film. This screen is specially constructed to meet the requirements of any theatre.

AN ELECTRONIC CARBON ARC LAMP

By *J. K. Elderkin*
Forest Manufacturing Corp., Newark, N. J.

This paper describes an electronic means for effecting the individual and separate feeding of arc carbons. A simple and compact electronic generator is utilized to vary the number of feeding impulses from 20 to 120 per minute, encompassing by far the required range of any arc lamp used presently or now contemplated.

Once the control is set for the individual average condition, it will maintain that setting indefinitely without requiring any attention. This feed mechanism uses no reduction gears, clutches, or fast-moving parts, thus reducing frictional wear to a minimum. The control was demonstrated.

CALCULATION OF SCREEN LIGHT DISTRIBUTION FROM BRIGHTNESS MEASUREMENTS OF THE CARBON ARC CRATER

By *M. T. Jones*
Research Labs., National Carbon Co.

A method is described for computing the distribution and amount of light projected on a motion picture screen from suitable brightness measurements of the carbon arc crater. These brightness data are combined with the characteristics of the light collection system to determine the light distribution over the film gate.

The present treatment is confined to a consideration of the illipsoidal mirror and the light-collecting elements, although generalization to condenser systems can be made with reasonable accuracy.

ELEMENTS OF THE THEORY AND PERFORMANCE OF CARBON ARCS

By *F. T. Bowditch*
Research Labs., National Carbon Co.

The fundamental behaviour of the carbon arc as used in motion picture photography and projection is described, with particular relation to the importance of proper circuit and equipment design, the phenomena associated with striking the arc, and the physical processes responsible for the spectral character and high brilliance of this source. Manufacturing processes and industrial applications are also reviewed.

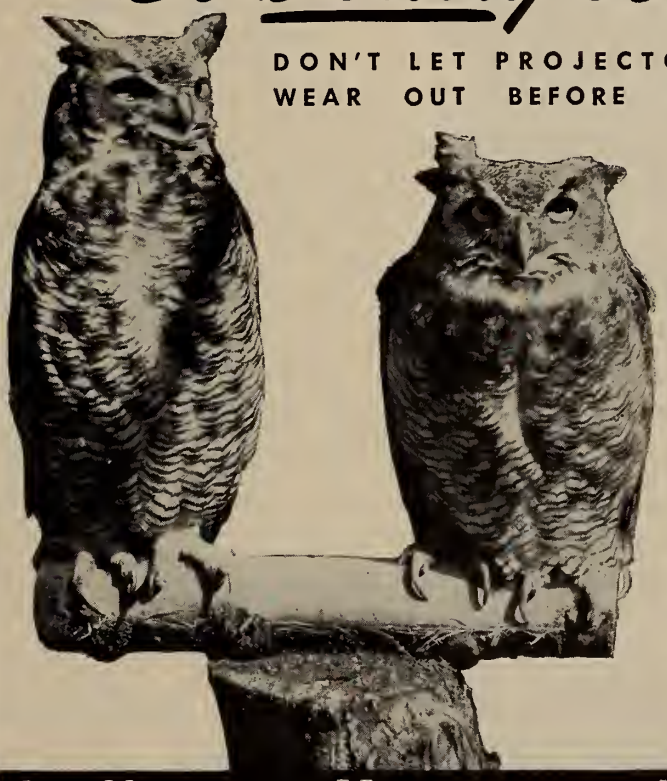
METHODS OF MEASURING RADIANT ENERGY AT THE FILM APERTURE

By *M. R. Null* and *R. J. Zabesky*
National Carbon Company, Inc.

A method is described for measuring in absolute units the radiant energy received at the film aperture of a motion picture pro-

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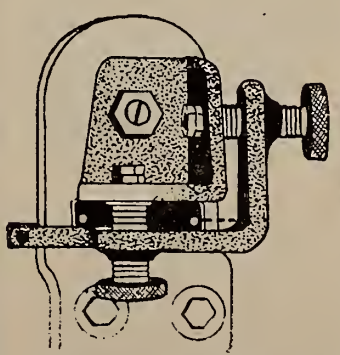
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jector. A water-cooled diaphragm with a pinhole of calibrated area is mounted in the aperture, and the beam of radiant energy passing through this pinhole is examined at a distance of several feet from the aperture plane. Here the radiant energy is of a low enough order to permit the use of a non-selective thermopile directly calibrated against a radiation standard as supplied by the National Bureau of Standards.

Sufficient readings are taken over the beam to permit an integration giving the total energy passing through the pinhole. This is then related to the pinhole area to give the energy per unit area in the aperture plane.

LIGHT AND OPTICS IN MOTION PICTURE PROJECTION

By *E. R. Geib* and *C. G. Ollinger*
National Carbon Company, Inc.

This paper, together with the Technicolor demonstration film, "Carbon Arc Projection," which was shown, outlines and discusses the relation of the carbon arc to the basic optics of projection; and the carbon arc's position in the broad science of light, sight and color is delineated.

AN AUTOMATIC SAFETY SPROCKET

By *Lloyd Mannon*
Control Engineering Corp., San Francisco

An automatic safety sprocket is described together with attachments and adapters to fit it to all types of 35-mm projectors. The conditions which cause the mechanism to operate to prevent film fires were discussed and a detailed description of the operations required to successfully prevent projector fires was given.

LEAD SULFIDE PHOTO-CONDUCTIVE CELLS FOR SOUND REPRODUCTION

By *R. J. Cashman*
Northwestern University, Evanston, Ill.

Lead sulfide photo-conductive cells developed during the war at Northwestern University show considerable promise in sound reproduction. These cells, in contrast with caesium-oxide phototubes used in present systems, exhibit a much higher signal-to-noise output and a lower impedance. The cell noise is not increased in the presence of background radiation. The frequency response is excellent and the sensitive surface is undamaged by high light levels.

As a result of the high infra-red sensitivity of these cells, an indirectly-heated exciter lamp has been developed which operates with an ordinary 60-cycle filament transformer. Rf or d. c. heating of exciter lamps is thus not required. A demonstration of the cell and lamp was given.

PORTABLE AND SEMI-PORTABLE SPEAKER SYSTEMS FOR 16-MM SOUND-ON-FILM

By *John K. Hilliard*
Altec Lansing Corporation, Hollywood

This paper describes three types of loudspeaker systems which have been designed for 16-mm sound-on-film reproduction. One system uses a Diacone speaker mounted in a portable leatherette carrying case. A 12" speaker is used and the acoustic radiation is obtained from two diaphragms attached to a single voice coil. The outer diaphragm is of the moulded cone type and the inner is a domed dural type of diaphragm which is attached at its edges to the 3" voice coil.

A second system is mounted in a portable cabinet which has 3.2 cubic feet and is resonated for maximum response down to 85 cycles. The speaker is of the 15" type and of similar construction to the 12" with the addition of a six-cell multicellular horn mounted directly in front of the 3" dural diaphragm.

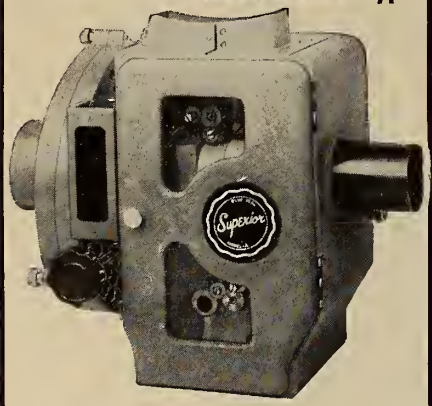
The third system consists of a duplex speaker and is intended for permanent and semi-permanent installations. A demonstration was given with specially recorded 16-mm film.

LOUDSPEAKER PERFORMANCE DATA

By *Vincent Salmon*
Jensen Mfg. Co., Chicago, Ill.

Loudspeakers intended for portable 16-mm sound projectors represent a compromise between the opposing requirements of small physical volume and high performance. The performance may be assessed by the loudness efficiency, absolute efficiency, pressure

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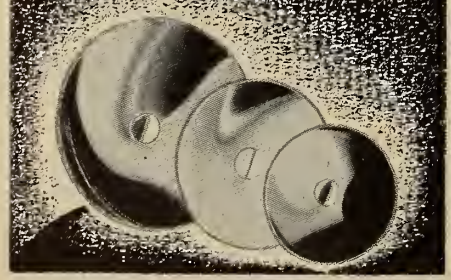


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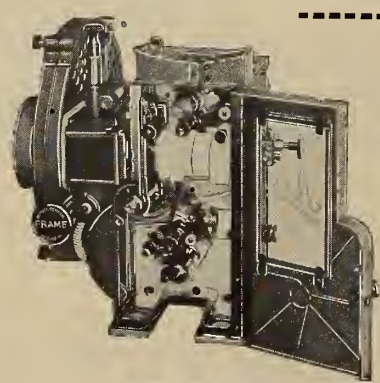
Gradual deterioration of projector arc lamp reflectors results in a corresponding loss in efficiency. Since the only light which can reach the screen must be reflected by the mirror, the loss in screen light is in direct proportion to the loss in mirror efficiency.

Endeavoring to make up this light loss through the use of more current represents a pure waste in the form of unwarranted power bills. Periodic mirror replacement accordingly is a good investment.

Strong precision reflectors for all types and makes of lamps are sold by independent theatre supply dealers.

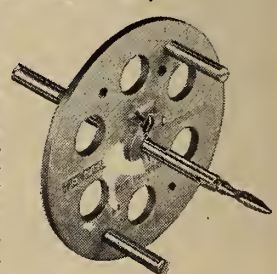
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response, distribution index, and distortion, all but the first being functions of frequency.

These terms were defined and discussed, with special emphasis on simple objective and subjective acceptance tests. Only direct radiator speakers were considered.

METHOD AND EQUIPMENT FOR CHECKING FILM APPARATUS SPEEDS

By *C. T. Owlett*
Eastman Kodak Company

The operation of a spring-driven motion picture camera is seriously effected if a mechanical tachometer is used to measure the speed. Equipment has been developed, and made to give a direct reading of camera speed utilizing a light beam as the connecting link.

MOVIES ON WHEELS—SOUND MOTION PICTURES FOR PASSENGER TRAINS

By *John G. Bitel*
Comprehensive Service Corp., N. Y. City

This paper discusses the practicability of converting existing railway diner cars for the presentation of motion pictures as a medium for relaxation while still retaining the use of the car for restaurant service. Determining factors for selecting available 16-mm standard projection equipment are given and problems presented by the moving train with respect to good screen results are outlined.

Necessary modifications to standard equipment are described and details regarding a rigid demountable screen and an adequate loudspeaker system are given. The large power capacity of the car's battery system, in conjunction with the G. E. amplydine convertor, is used to fully operate the complete motion picture installation. The paper cites the final results obtained, passenger comments received, and the general public reaction to the installation made for the Chesapeake and Ohio Railway.

EFFECT OF FEED AND HOLDBACK TENSION ON PROJECTION LIFE OF 16-MM FILM

By *C. F. Vilbrandt*
Eastman Kodak Co., Rochester, N. Y.

With the advent of 16-mm film into the educational and commercial fields has come the demand for increased projection film life. At the same time, to avoid loose, unsatisfactory winding of the large projection rolls in use today, higher windup tensions are required.

In this paper the effect of the wind-up tension on the projection life of film is described and compared with the effect of feed tension. The importance of the relationship between sprocket pitch, film pitch, tooth shape, and film wear is discussed. A high speed motion picture was shown to illustrate several of these effects.

PROPOSALS FOR 16-MM AND 8-MM SPROCKET STANDARDS

By *J. S. Chandler, D. F. Lyman and L. R. Martin*
Eastman Kodak Co., Rochester, N. Y.

This report describes the background and derivation of proposals to replace Specifications 222.6—1941 and 222.18—1941. The proposed new specification consists of four parts: illustrations, formulas, nomenclature, and appendix. The standard has been developed to give the designing engineer an opportunity to specify the dimensions of circular pitch or root diameter, tooth thickness, and tooth profile for a particular application or condition.

Formulas are based upon the range of film shrinkage to be accommodated and the amount of contact between film and sprocket. Graphic illustrations are given of the various relationships existing between the film and sprocket as considered in arriving at the proposed formulas. Indications are given of the probable type and extent of modifications desirable to establish complete agreement with test data obtained to date. Special consideration is given to lateral dimensions and to shape of the tooth in relation to the path of the film.

[NOTE: This paper and the one by Dr. Vilbrandt are revisions of papers under similar titles presented at the Fall 1946 convention in Hollywood. They were represented at the Chicago convention before *Journal* publication in order to include additional experimental information.]

MY FIRST FIFTY YEARS IN MOTION PICTURES

By *Oscar B. Depue*
Chicago, Illinois

This is intimate, chronological account of experiences as a partner of the world's leading travelogue exponent, Burton Holmes. Mr. Depue describes their first meeting back in 1893; their world-wide wanderings through the years up to 1917; and the problems he met in devising camera, developing, projection and film printing equipment in those early days.

The period from 1917 to the present is covered with remarks regarding the establishment of the Burton Holmes Films Laboratory; the theatrical release of a weekly travelogue for sixs years, and Mr. Depue's invention and manufacture of 35- and 16-mm printers and automatic light control boards.

PYSCHOLOGY OF THE SOUND FILM

By *L. Mercer Francisco*
Francisco Films, Chicago, Ill.

As an educational instrument the sound film is particularly effective for influencing people in groups, bringing to bear factors in social as well as individual psychology: social facilitation, the impression of universality, and prestige. The physical conditions under which its message is received and the absorption of the audience in the continuity

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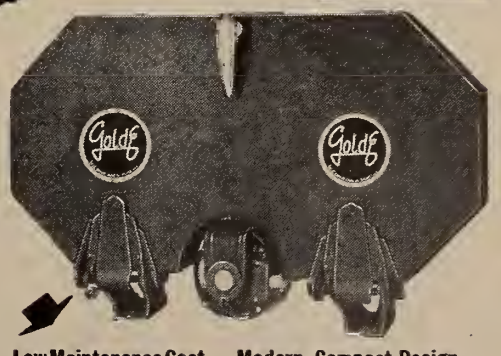
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of the screen story polarize the attention almost to the degree of hypnosis, with corresponding effect upon the subconscious and memory.

Little intellectual effort is required to comprehend the meaning of visual-action images when coordinated with spoken words. The appeal to the emotions is equally strong through the control of emphatic responses by means of meaningful real-life situations dramatically portrayed.

Self-identification by the audience with the screen characters and subject matter provides vicarious experience, short-cuts the learning process, and arouses the will to believe or to act.

PRODUCING A METALLIC SALT SOUND TRACK ON ANSCO COLOR FILM

By *J. L. Forrest*
Ansco, Binghamton, N. Y.

In the Ansco color process the silver is entirely removed from the film, leaving dye in the three layers. The combination (maximum density) of the subtractive colors—cyan, magenta, and yellow—has a visual density of about 3, which is sufficient to produce good screen contrast. The maximum density, while visually opaque, has a transmission band in the near infra-red in the region of 8000 A. U.

The caesium-type phototubes used in most sound projectors have the maximum peak of sensitivity in the invisible red. It is obvious, therefore, that a dye sound track transmitting in this region will not modulate a light beam from an incandescent source sufficiently when read by a caesium phototube.

To overcome this problem, it is necessary to differentially process the film so that sound track modulation are opaque to red light without affecting the dye picture area of the film. This paper describes a simple method and equipment for processing the film by which a metallic sound track is produced without affecting the dye images of the picture area.

KODACHROME MOVIES OF THE HUMAN AIR AND FOOD PASSAGES

By *Dr. Paul H. Holinger* and *J. D. Brubaker*

Special photographic equipment and technics have been developed for motion picture photography of the human air and food passages. These films graphically visualize the vocal cords, windpipe and bronchial tubes, and the esophagus from the mouth to the stomach, to provide unusual clinical records that are invaluable as teaching and research material.

The camera developed for this work permits constant visualization through the bronchoscope for finding and focusing as well as during the actual filming. The optical and electrical systems were described and illustrated and a short representative film was shown.

SOME NEW USES OF INVERSE FEEDBACK IN THEATRE SOUND SYSTEMS

By *R. W. Lee*
General Precision Laboratory, Inc.

The use of negative feedback in audio amplifier systems has become standard rather than a novel feature. However, the application of feedback has been more or less restricted to the reduction of distortion, hum, noise, *etc.*, associated with the vacuum tubes which make up the amplifier.

This paper presents a number of arrangements where negative feedback has been found quite useful in other respects, *i.e.*, for the cancellation of capacity in high-impedance circuits, for the reduction of distortion in gas photocells, etc. A full realization of the usefulness of a cathode follower as an impedance changer also leads to some new circuitry, the advantages and disadvantages of which were discussed.

PROPOSED LOUDNESS EFFICIENCY RATING FOR LOUDSPEAKERS AND THE DETERMINATION OF SYSTEM POWER REQUIREMENTS FOR ENCLOSURES

By *H. F. Hopkins* and *N. R. Stryker*
Bell Telephone Labs., Inc.

Experimental and computed data relating to the loudness contribution of various ranges of the frequency spectra of speech and music are correlated with the corresponding energy distribution. A relatively simple measurement of sound pressure and a knowledge of certain acoustic radiation phenomena are applied to this correlation to form the basis of a method for predicting the loudness established by loudspeakers in enclosures.

A loudness efficiency rating for loudspeakers is suggested and its application to sound system engineering problems is described.

New Toledo Movie Supply House Opened by Al Boudouris

A new theatre equipment and supply company which will serve northwestern Ohio, northeastern Indiana and southern Michigan, with headquarters in Toledo, Ohio, opened for business March 1, according to an announcement by Al Boudouris, who will head the new enterprise. Known as General Theatre Equipment Company, the firm has opened a store and service shop at 109 Michigan Street. A complete line of equipment and supplies will be offered for sale, including Century projectors and sound systems, Ideal chairs, Strong projection lamps, rectifiers and reflectors.



Al Boudouris

Twenty-four hour repair service will be rendered by experienced projection and sound engineers.

G. P. E. 1946 Net Increased

General Precision Equipment Corp. reports consolidated net profit of $1,742,694 for the year ended December 31, 1946. The net was equivalent to $2.90 a share on the 601,087 shares outstanding at the end of the year as compared with $1,390,954 or $2.31 per share on the same number of shares in 1945. Consolidated net sales for the year amounted to $23,261,996, compared with $25,484,122 in 1945.

The report says the net was arrived at after estimated Federal income taxes but before credit for special items in the net amount of $340,256. Special items consist of the book profit of $890,301 realized on the sale of 39,600 shares of Twentieth Century-Fox Film Corporation common stock sold during the year at an average price of $49.50 per share, less the write-off of $550,045 representing the excess cost of investment in subsidiaries acquired in 1944 over their applicable book value at acquisition.

In a letter to stockholders, Earle G. Hines, president, said that the manufacturing activities of various subsidiaries were adversely affected by a shortage of certain materials.

New Victor Voltage Regulator For 16-mm Projection Units

For 16-mm work the power supply should be maintained at approximately 115 volts. Yet normal current in some localities may range from 90 to 110 volts, and in other localities from 120 to 135 volts, depending upon the distance from transformer and other factors. Low voltage results in poor screen illumination; while too high a voltage occasions premature lamp failure.

Victor Animatograph Corp., Davenport, Iowa, announces a new voltage regulator for operation at 1000 watts—110 volts, 60-cycle A.C. The regulator is plugged into the A.C. outlet, then the knob is turned until the meter needle indicates 115 volts. Thereafter the projector power cord is plugged into the regulator.

Operating tips advanced by Victor: advancing the output beyond 120 volts will shorten lamp life and likely will "blow" the amplifier fuse; during projection occasionally check voltage indicator for current supply fluctuation, and adjust tap switch as necessary; do not use on D.C., and do not use with projection lamps in excess of 750 watts.



Record Eastman 1946 Profit

Net profit of $35,691,318, a record high, was reported by Eastman Kodak Co. for 1946. Figure is comparable to the $32,715,632 earned for 1945, a record until the latest report. Net sales were reported at $274,703,448 last year, compared with $301,501,854.

Year's profit benefited by a $3,936,800 tax reduction that will not recur, the statement noted. Net profit without the benefit of the tax reduction was $31,754,518, equal to $12.67 per share on the outstanding common.

Dividends paid during the year totaled $17,702,033, representing six per cent on the preferred stock and $7.00 per share on the common. Similar amounts were paid in 1945.

Guessing

can be expensive



Guessing can be expensive at any time but particularly so today with the present limitations on new projection room equipment and with the uncertainties of replacements. Every projectionist should know the whys and wherefores of his equipment. He should know what to do and what not to do when the equipment fails to function properly—and how to keep the show going until the service inspector arrives at the theatre.

PROJECTIONISTS' SERVICE MANUAL is a complete, compact compilation and a valuable reference work. All items therein are grouped according to classifications and contain sound practical suggestions relating to the many projection room troubles—their causes and how to remedy them.

A copy of this valuable trouble shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. local unions have ordered this book in bulk and placed a copy in each projection room. The price is right —only $3 per copy, postage prepaid. Order your copy now or ask your local union secretary about our special low-price bulk offer.

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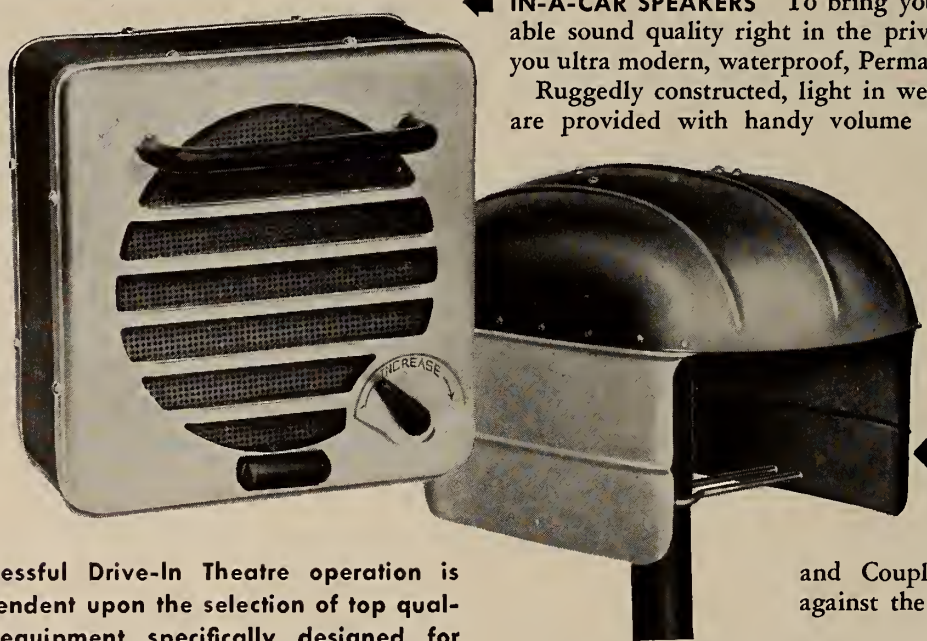
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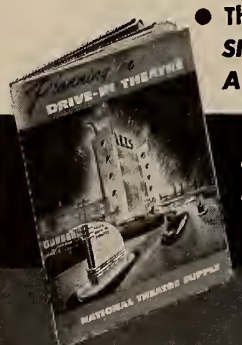
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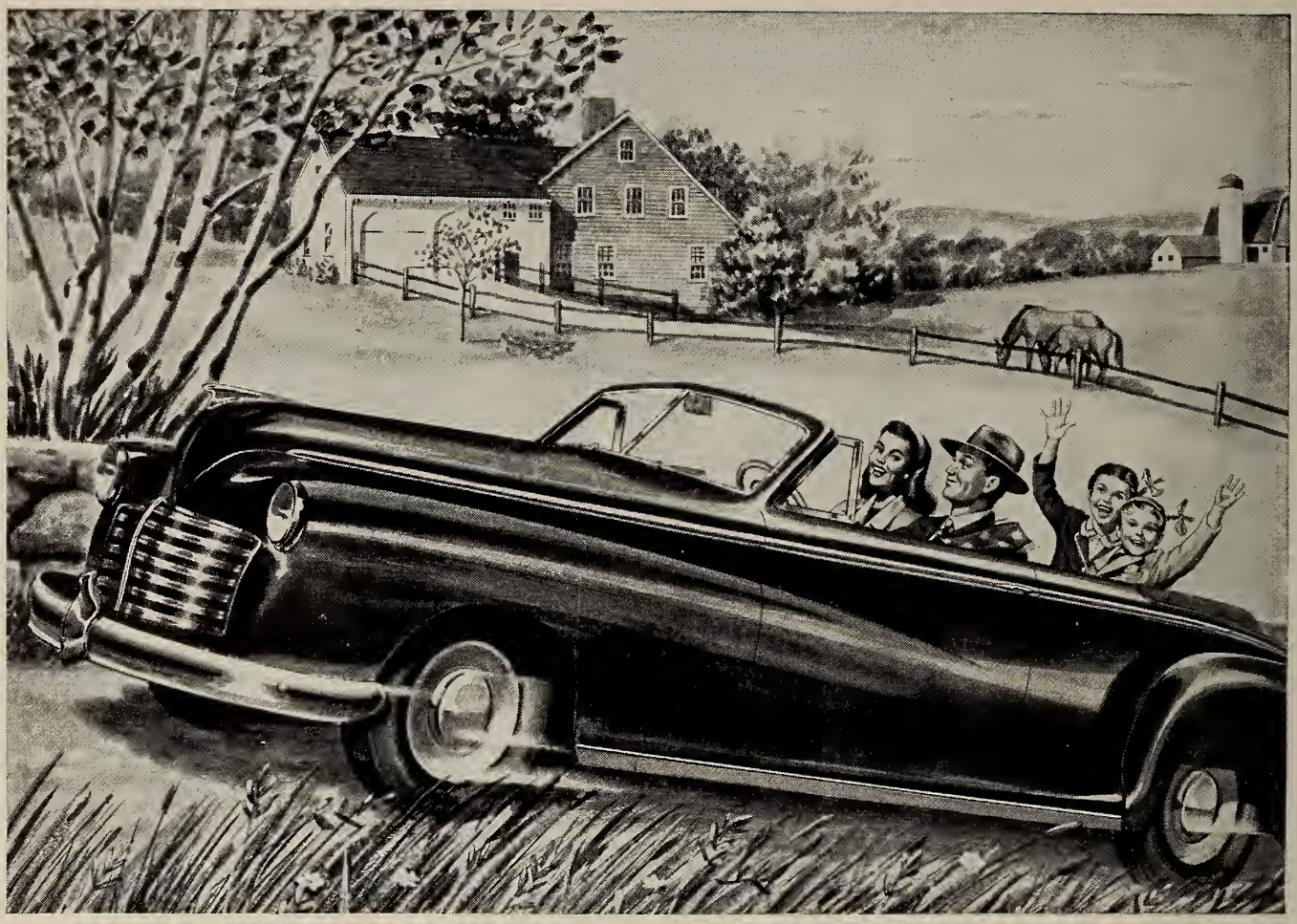
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HENRY B. SELLWOOD, *Editor*

Volume 22 MAY 1947 *Number* 5

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MONTHLY CHAT

FILM mutilation reportedly has become so rife in the Dallas area as to occasion the imposition by distributors of a stiff schedule of charges, down to the last inch of film, as the basis for billing exhibitors. The latter, of a certainty, will attempt to pass the charges along to projectionists.

Film mutilation is an old story, as is the precise pitch of the exhibitors' squawk when billed therefor. But nobody makes any positive contribution to the situation; the approach of all concerned is strictly negative, from the Conservation Dept. of the Johnston office right down the line through the exchanges to the theatres and winding up with projectionists. Incidentally, we're not giving a pass to the latter.

We all know the score anent film mutilation: it's compounded of an insufficient number of prints in a given area, defective shipping cases, inadequate inspection in the exchanges, worn and ill-adjusted projection equipment, including rewinds, and plain downright mishandling the result of incompetence or indifference.

There's no cure for the latter except swift and severe disciplinary measure against the guilty projectionists. This should be a matter of general craft pride in the interest of preserving craft standing in the art.

On the other counts there is much that can be done. We think that the major deficiency is the shortage of prints in a given exchange territory. The enforced wartime print shortage gave the distributors ideas: why not hold the national print order down to wartime levels? We got by, didn't we? But the distributors forgot that during the war everybody was on his toes to make it do, make it do. That stuff is out today, because exchange and projection facilities have had all the pounding they can take. Exchanges have been doing a better job lately, but the gals can't check a print they don't even see. Some prints are not in the exchange long enough to permit even cursory inspection; the route is practically from one theatre to another.

The distributor could clear up the trouble by insisting upon good projection-room equipment for use with his prints. But he won't. The exhibitor will resist spending a dollar for new equipment until he's forced to. Thus the projectionist is on his own.

The answer for projectionists is simple: check every foot of film received, note all defects, make out a report in duplicate, sending the exhibitor one copy and keeping one. The same procedure should apply to projection equipment. In fact, all Locals should have a printed form for such purposes, being sure that it bears on its face a disclaimer for any damage.





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If he is to get the most from this role . . . to give the most to the public . . . the newsreel photographer naturally needs superior film. That's why he prefers to work with members of the large and well-known family of Eastman motion picture and sound films.

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VOLUME XXII MAY 1947 NUMBER 5

A Standard .943 Intermittent Sprocket

By HENRY B. SELLWOOD

A review of the considerations prompting the adoption of the .943-inch 35-mm projector intermittent sprocket as a new American Standard replacing the present standard .935-inch sprocket. Opinions of representative manufacturers are appended hereto.

NOW incubating in the various channels through which a proposal for a new American standard must pass is the recommendation of the Society of Motion Picture Engineers, upon the instigation of its Standards Committee after exhaustive investigation, that the present standard 35-mm projector intermittent sprocket of .935 inch be supplanted by a .943-inch sprocket. Adoption of the latter as a standard is expected to result in greatly reduced wear of both film stock and sprockets.

Almost all major projector manufacturers, anticipating favorable action on the S.M.P.E. proposal, have already abandoned the .935 sprocket for one of larger dimension. It seems certain that within a year all projector manufacturers will be supplying the larger sprocket, although there exists some slight disagreement as to the exact size to be used.

Larger Sprocket Not New

As long ago as 1930 American Standard *Z22.35* called for an intermittent sprocket diameter of .945 inch. This larger size, in fact, was supplied to the trade; but there immediately arose many complaints of noisy projector operation and excessive wear of both film stock and the sprocket itself. Of course, the rapid wear in both cases was contributory each one to the other.

The result of these numerous complaints, of course, was an expensive reversion to the .935-inch sprocket, at a not inconsiderable expense to projector manufacturers and an understandable aversion to any further change in dimensions. Thus, *Z22.35* has never been a truly observed standard.

Projection engineers generally, while not subscribing to the idea that the complaints were wholly justified, attributed these deficiencies to the then unfavorable shrinkage characteristics of the film stock. Similarly, there is now general agreement among projection people that this problem has succumbed, so to speak, to the wartime demand for strict conservation of both film stock and sprockets, the greatly accelerated research pace having effected substantial improvement in the shrinkage characteristic of film stock.

Evidence in support of the engineers' original contention that the complaints were more imaginary than real is the fact that as early as 1933 larger-diameter sprockets were in use in several well-known European projectors. The intermittent sprocket then used on the Ernemann projector, widely used throughout France and Germany, was .9452 inch in diameter; while the Philips mechanism, used in many countries, is equipped with .945-inch sprockets.

Undaunted by the protests engendered by the first move toward a larger sprocket, a special sub-committee on intermittent projector sprockets was formed by the S.M.P.E. Standards Committee to nail down the findings of various laboratory tests which had consistently indicated a much longer film life with a larger sprocket, no less than less wear on the latter. Completing its long, arduous and painstaking task in 1946, this sub-committee conclusively proved its point in behalf of the larger sprocket.

Film Shrinkage Characteristics

Today the normal shrinkage of most positive film stock lies between 0.0 and 0.6 per cent during its normal projection life. Theoretically, the film is in perfect mesh with the .935-inch sprocket when it has a shrinkage of 1.2 per cent. Frequently the maximum number of projections is attained at this point, but in not a few instances the maximum occurs at a point well beyond the point of perfect mesh. While the reason for the maximum number of passages to occur at the point of perfect mesh has not been clearly established, there is one possible explanation.

When the pitch of the film is *greater*

Already Using Larger Sprocket

By THOR MATTHEWS

Motiograph

Adoption of the .943-inch intermittent sprocket as an American Standard would suit us very well since we are already using it on the new model AA Motiograph projector. We have had excellent results with this larger sprocket in the field to date.

than that of the sprocket, the film wedges onto the sprocket teeth, the film travelling faster than the circumference of the sprocket. Consequently, all of the driving action is accomplished by the sprocket teeth.

When the pitch of the film is *less* than that of the sprocket, the circumference of the sprocket travels faster than the surface of the film. In this case a considerable portion of the driving action is accomplished by contact along the circumference of the sprocket as well as by the sprocket teeth, thus causing the number of passages to increase to a certain point as the pitch of the film becomes less than that of the sprocket.

Likewise, the failure of the maximum number of projections to occur at the calculated point of perfect mesh can be explained by the stretching of the film at the point of impact. If the film stretches upon impact of the sprocket tooth (and this appears to be a reasonable assumption) the effective pitch is greater than the calculated or measured pitch. Therefore, to obtain the optimum projections, the pitch of the film should be less than that required to give perfect mesh.

Films of any pitch whatsoever may be run on projectors with intermittent sprockets of different diameter and, if other factors are controlled, the results will still be comparable.

Sprocket and Film Wear

These principles have been recognized by film manufacturers and projector manufacturers alike, and this general agreement was the basis for the approval of the .0945-inch diameter spocket and its adoption as an American Standard in 1930. Why, then, has this larger sprocket not been in general use in this country.

The answer is that projector manufacturers have been concerned over the possibility of increased wear of the sprockets, their fears being based on the theory then held. It is quite obvious that if the film be considered as a steel tape, the wedging action of the film onto the entering tooth should wear away the face of the tooth uniformly.

The principal objective of the S.M.P.E. sub-committee previously mentioned was the determination of the comparative wear of the .935-inch and the larger intermittent sprockets. Fortunately, the theory formerly held as to sprocket wear was somewhat in error. In every theatre in which the oversized sprockets were compared with the .935-inch ones, the latter showed the most wear.

Wear on the .943-inch sprocket is predominantly at the base, but it is slight and not sharply defined. There is no evidence of a hook. The wear on the .935-inch sprocket, however, shows that the film cuts deep grooves into the face of the teeth. The striking thing about these grooves is that they vary in depth and in the distance from the base of each of four teeth.

The increased extent of wear on the .935-inch sprocket as compared to that on the oversized sprocket is explainable. In the case of the former, the additional force necessary to thrust the film ahead of the rotational speed of the sprocket manifests itself in increased wear of *both* film and sprocket teeth.

Proper Film-Sprocket Pitch

When the pitches of film and sprocket are equal, the driving force is spread over two, or even three, teeth simultaneously, resulting in decreased wear on both film and sprocket. This condition should hold true even when the two pitches are nearly equal, as a result of the local stretching of the film upon impact. Fortuitously, therefore, the use of larger intermittent sprockets enable substantially increased film life with no increase in sprocket wear.

It is impossible to align the film on the intermittent sprocket so that the latter will strike the film in the center of each row of perforations. This is because the transverse pitch of the sprocket is less than that of the film. If the film be centered on the intermittent sprocket on one row of perforations, the sprocket will ride very near the inside corner of the other row of perforations and wear or rupture will then almost invariably occur at the point nearest the sprocket tooth.

It is believed that the best alignment with the present intermittent sprocket occurs when the sprocket is centered as nearly as possible on *each* row of perforations. Even under this condition the preponderance of wear occurs in the corners, and occasionally at the outer corners also. Only rarely does it occur directly under the point of impact in the case of the .935 sprocket. This is because the perforation is weakest at the points of curvature, the wedging-on action causes a strain throughout this en-

(*Continued on page* 27)

Leans Toward .940-Inch Sprocket

By KARL BRENKERT

Brenkert Light Projection Company

I have always felt that the intermittent sprocket diameter should be greater than .935-inch; but I am inclined to doubt that it should be as great as .943. I believe our attitude will be to make these sprockets to about .940-inch diameter, which we feel will not cause any difficulty and will be an improvement over the .935 diameter.

With this larger sprocket the entering tooth will not have to climb the film perforation as far as it now does on the .935-inch diameter.

.943 Sprocket Entirely O.K.

By LARRY DAVEE

Century Projector Corporation

We believe that the .943-inch sprocket is entirely satisfactory. You will recall that the Waller Gunnery Trainer (1941 *et seq.*), using nine Century projectors operating in synchronism, used the .943 sprockets. This equipment was to operate 24 hours per day continuously (not intermittently as in the theatre, *i.e.*, two-projector operation). We thus obtained operating records which could not be duplicated in regular theatre operation except over long carefully controlled periods.

The experience of a few years ago anent the larger sprocket was that it created "undesirable noise". This may have been true for many reasons, none of which, however, were adverse to picture quality or to the life of the projection equipment or the film.

'Noise-Conscious' Projectionists

Some projector manufacturers have long concentrated on a selling campaign of "quietness of operation". This has gone so far as to make the projectionist unduly conscious of "necessary noise," and especially those originating in and around the intermittent movement. The noise with the .945 sprocket consisted of a "tearing" sound caused by shrunk, brittle film leaving the sprocket. It caused no damage to sprockets or film, but to the sensitive ears of the "noise-conscious" projectionist it certainly sounded bad.

Eastman Kodak Co., however, has since improved the shrinkage characteristics of film to a point where the .943 sprocket is wholly desirable. A .945-inch diameter is, I believe, the exact dimension corresponding to the sprocket hole pitch of unshrunk film, thus the .943 dimension allows a little margin of safety.

The aforementioned "noise condition" will occur only when the pitch of the sprocket holes of the film is less than the pitch of the sprocket teeth.

O.K., But Dictates Caution

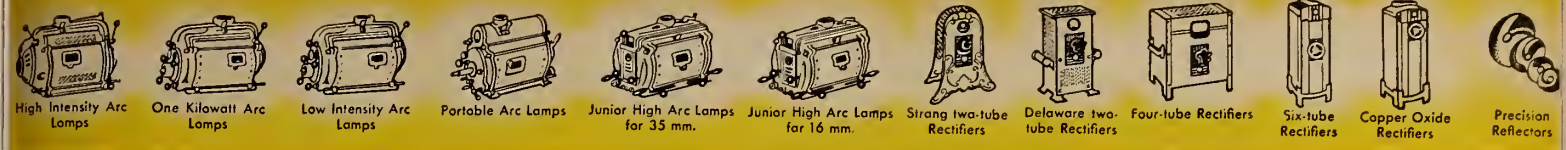
By HERB GRIFFIN

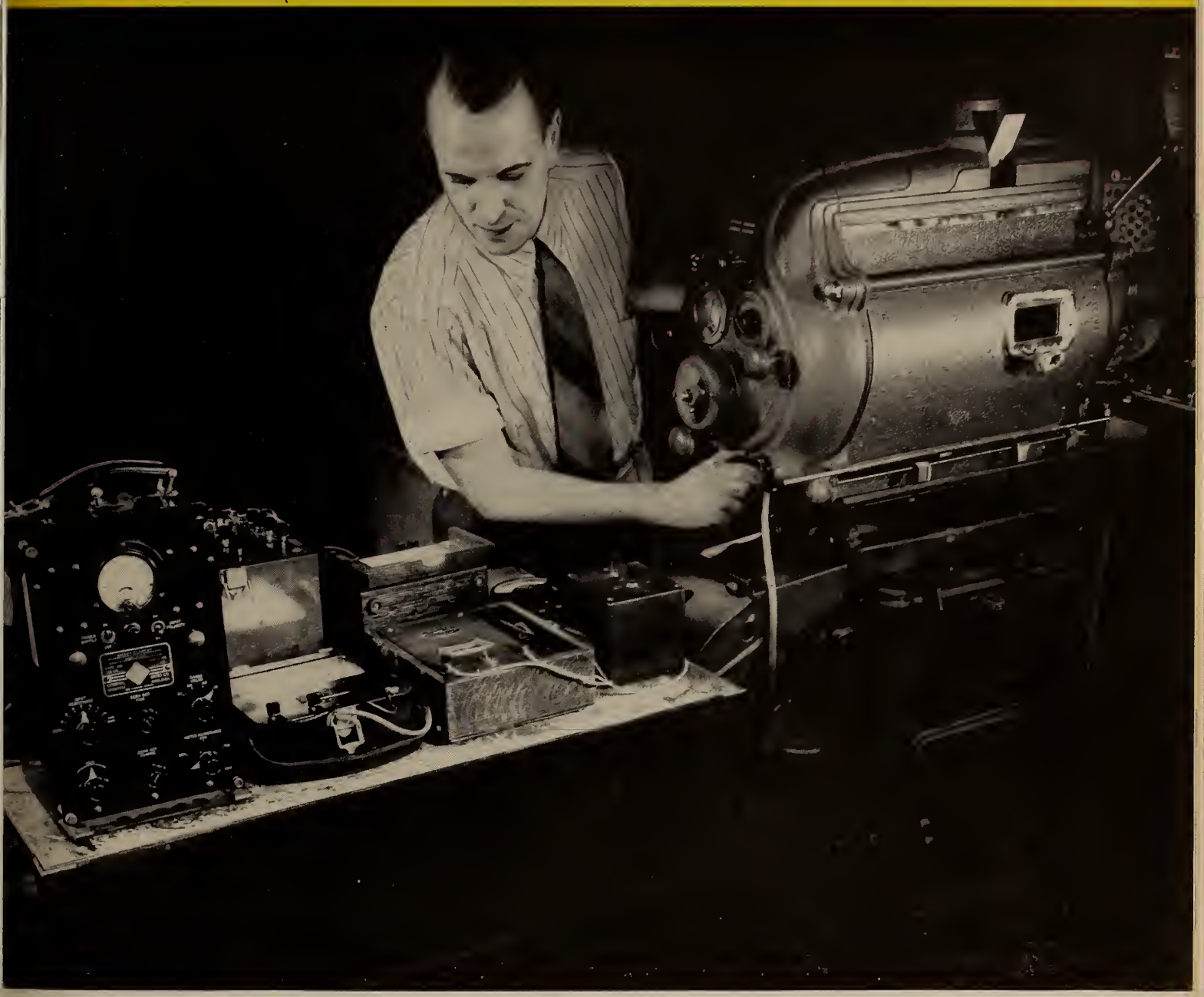
International Projector Corporation

I approved the .943-inch intermittent sprocket because of the voluminous work done by the special S.M.P.E. committee, by Eastman Kodak Company, and by the projector manufacturers themselves. The trouble experienced in the '30's with the .945 sprocket was caused, I believe, by the amount of shrinkage present in release prints at that time.

However, following extensive work by Eastman, film shrinkages are now of an extremely low order, and there should be no difficulty experienced with the .943 sprocket.

It will readily be understood, of course, that projector manufacturers, mindful of their past experience with larger sprockets, would want to make extensive experiments, preferably under actual theatre operating conditions and under the watchful eyes of first-flight projectionists, before going all-out on the proposed new standard .943 sprocket.





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Film Projectors for Television†

By RALPH V. LITTLE, Jr.
Radio Corporation of America

That television will make use of 35- and 16-mm motion picture film is a certainty. The method of televising motion pictures using the storage-type pickup device is described herein. Theatre and television projection practices are compared; and methods of meeting proposed RMA Television Standards are discussed. Recently designed 35- and 16-mm RCA television projectors are described.

This presentation contains basic facts onent equipment and operating technique incident to the televising of motion pictures via unconventional projection equipment, and as such it merits the most serious consideration by every projectionist. It is suggested that these data be retained for periodic future reference.

MOTION picture films are reproduced in a television system by projecting the image upon the photo-sensitive surface of a pickup tube in the television camera. The video signal is generated at this point by a process of scanning the film image electrically to produce an electrical or television signal.

There are several possible projector systems for effecting this transfer of optical information into a video or picture signal. They can be divided into two main classifications, using either continuous or intermittent film motion. At RCA we have concentrated our efforts on the "intermittent" type of film projector.

In this system it is essential that the television pickup tube have "storage" or the ability to retain a photoelectric charge image corresponding to the illuminated picture pattern projected on its light-sensitivity surface by the action of a light-pulse applied during those intervals when the film is stationary in the film-gate. The "Iconoscope"[1] tube has this property of storage, which allows the picture information to be projected, stored, and then utilized to form an electrical picture signal by television scanning during the time intervals when the tube is in complete darkness.

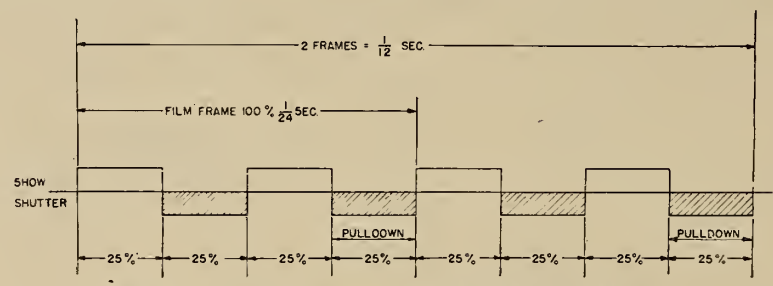


FIG. 1. Thirty-five millimeter theatre projector time cycle.

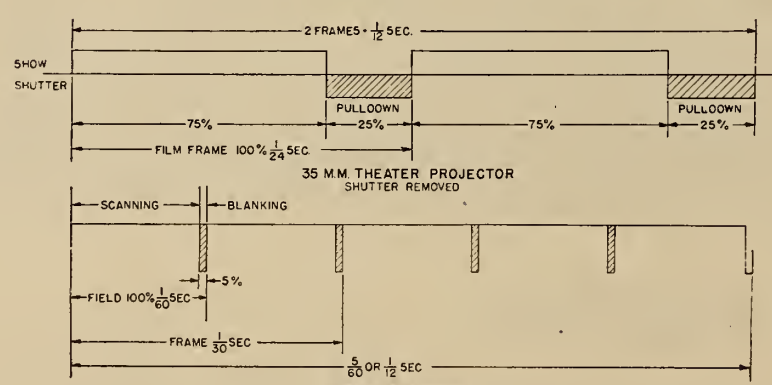


FIG. 2. Time-cycle comparison.

The Scanning Process

The scanning process consists of a systematic sweep from left to right and from top to bottom of the photo-sensitive area by an electron beam followed by the return of the beam to the starting position. The time required for the beam to return to the top of the raster after completing a vertical scan is called the *retrace time*: during this interval the beam and the system are cut off by the use of a vertical blanking pulse.

It is during this blanking time that the film is at rest in the projector and the picture is flashed on the mosaic by a high-intensity light pulse. The stored picture is then scanned in complete darkness by the electron beam during the succeeding vertical scanning interval.

Motion picture practice has standardized on a projection rate of 24 frames per second (f.p.s.) for both 16- and 35-mm sound films. The method of projection is such that the projected light is interrupted twice per frame: once to permit pull-down to the successive frame, and once during frame time to give an additional interruption to the picture image.

This double showing of each frame reduces the sensation of flicker to the eye by doubling the repetition rate of the flicker.[2] Since each picture is actually seen twice, the flicker or field frequency is 48 times p.s., high enough to give the illusion of no flicker at all at the picture brightness normally employed in theatres.

The RMA recommends a television system that can be tied in with the 60-cycle power widely used in America. This minimizes the effects of hum pickup and makes electrical filtering at both the transmitter and the receivers considerably easier and more economical. The repetition frequency of television pictures is therefore 60 fields p.s. well above the perceptible flicker rate.

Interlacing,[3] a system of transmitting all the odd-numbered scanning line detail in one field followed by all the even-numbered scanning line detail in the next field, produces one completely scanned picture in one frame or 1/30 second. This gives an effect quite analogous to the action of the shutter in standard theatre projectors.

Scanning begins in the upper left-

† J. Soc. Mot. Pict. Eng., February 1947, p. 93.

[1] Reg. U. S. Patent Office.

[2] Engstrom, E. W.: "A Study of Television Image Characteristics," Pt. I, *Proc. I.R.E.*, *21*, 12 (Dec. 1933), p. 1631; Pt. II, *Proc. I.R.E.*, *23*, 4 (Apr. 1935), p. 295.

[3] Kell, R. D., Bedford, A. V., and Trainer, M. A.: "Scanning Sequence and Repetition Rate of Television Images," *Proc. I.R.E.*, *24*, 4 (Apr. 1936), p. 559.

hand corner and proceeds in parallel lines until the scanning beam reaches the bottom of the raster. The even lines have now been scanned and the beam returns to scan the odd lines. The present system scans 262½ parallel lines during one field and 262½ alternate lines during the successive field, to form a 525-line raster at the rate of 30 frames p.s. This gives a repetition rate of 60 fields p.s. which is high enough to eliminate flicker without requiring the prohibitively wide frequency channel necessary for other methods of arriving at the same result.

However, the adoption of standards giving a scanning of 60 fields or 30 complete frames p.s. using standard 24 f.-p.-s. moving pictures has required the development of special television-type motion picture projectors.

Picture Fields and Frames

Certain fundamental definitions can be introduced in order to develop a useful approach to an understanding of the television processes which are taking place when film transmissions are being made. Terms which are closely analogous in motion pictures and in television can be used to advantage. By using the term "field" to designate each interval in which motion picture or television information is projected, we can say that theatre motion picture projections are at a rate of 48 fields from 24 f.p.s., and television images are made up of 60 fields interlaced to become 30 f.p.s.

Considerable time is required between frames to move the film past the aperture from one frame to the next: during this interval the light is cut off by the shutter whose additional function is to interrupt the light once during the frame time.

In the sequence diagram of Fig. 1, the first block indicates showing time; the next shaded portion indicates shutter time; the third shows time; and the fourth, shutter time to complete one frame. The second shutter time covers the film pull-down interval. Fields and frames are designated and the relative intervals for 35-mm practice are shown.

Line Cycle Comparison

In television there is also a function comparable to pull-down which must be completed between fields: this is the return of the scanning beam from the bottom of one scanning raster to the top of the next scanning raster. An electrical blanking signal is used during this interval to make the picture beam blank or cut off so as to allow for an invisible retrace of the scanning beam. The signal used is called *vertical blanking* and occurs at the end of each vertical scanning field.

The terminology in Fig. 2 is similar to that used in Fig. 1; the difference in the proportion of showing to blanking is noticed at once. A change has been made in the representation of the theatre projector cycle, removing the shutter in order to permit maximum showing time. Television scanning is characterized by using a nominal 5% of the total available time for blanking between fields. The remainder of the time is used for scanning or showing.

The problem is to obtain picture information for the television system at a repetition rate of 60 times p.s. in order to have information for each television field, and still run the film at 24 f.p.s.

We can see that the scanning intervals of the television system do not occur in such a manner as to give uniform picture information from the film to the tele-

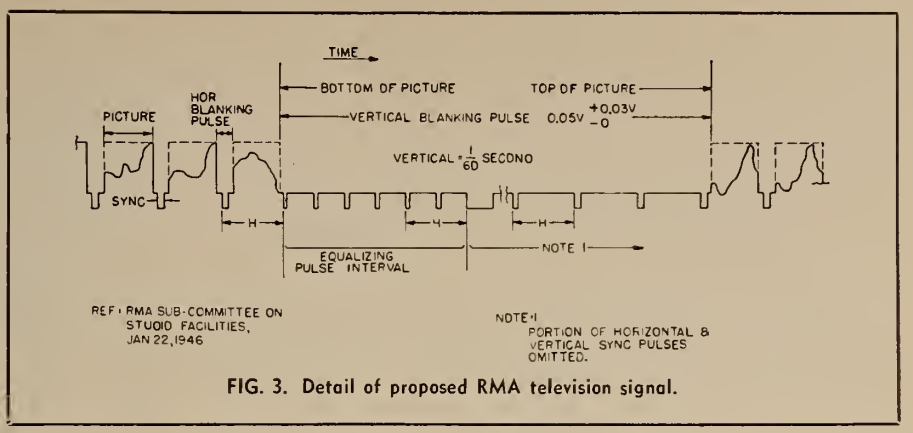


FIG. 3. Detail of proposed RMA television signal.

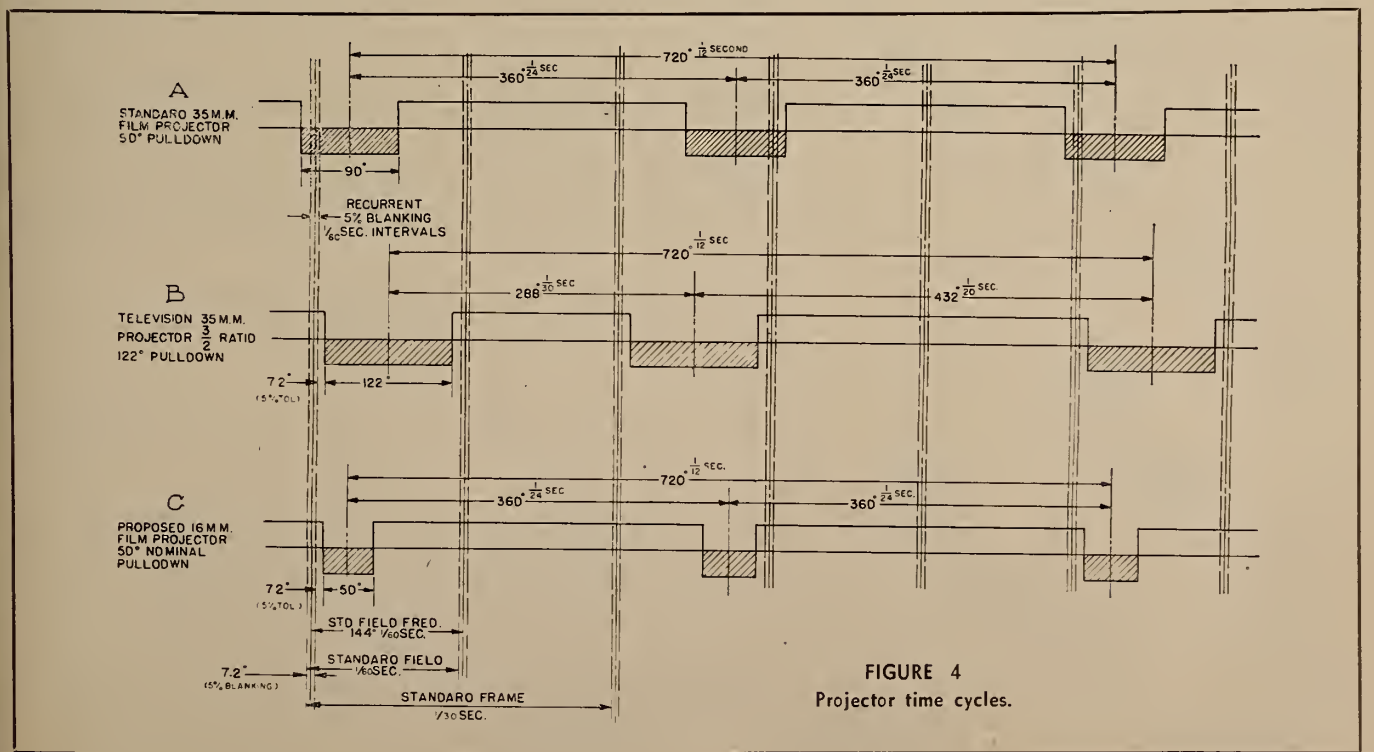


FIGURE 4
Projector time cycles.

vision system. Scanning times occur in some cases during pull-down so that the picture information would change during a scanning and hence give the equivalent of travel-ghost. Pull-down requires such a long interval that it is impossible to use a conventional projector and have the required information available for each scanning.

This alternative suggests itself: the television system can obtain video information during blanking by the storage principle. The Iconoscope allows the picture information to be supplied during the interval of blanking, stored as an electronic image, and scanned during periods of darkness. Therefore, methods must be devised to have a stationary picture available for every television field.

A single television field is shown in Fig. 3 as taken from the proposed RMA standard signal recommendations. It illustrates the design requirements on television showing time.

The interval designated between *bottom* and *top* of picture is the vertical blanking time and is the time between scanning fields in which we must expose the television camera. The duration is shown as 5% with a plus tolerance of three.

Projector Time Cycle

Examination of this chart, line (*A*), shows two standard 35-mm picture frames each of 1/24 sec. duration, with each frame represented as a 360-degree cycle; from this we see a pull-down time indicated as 90 degrees, leaving the balance as showing time, if we ignore standard shutters in this discussion.

In this chart, television fields with 5% blanking have been added to scale. These blanking intervals must occur during projector showing-time intervals. The most important thing here is the extremely short time interval between television fields, and the impossibility of a fast enough pull-down to accommodate the television system.

Let us see how we can circumvent these practical mechanical limitations. If we use the Iconoscope we can store a picture during the intervals of vertical

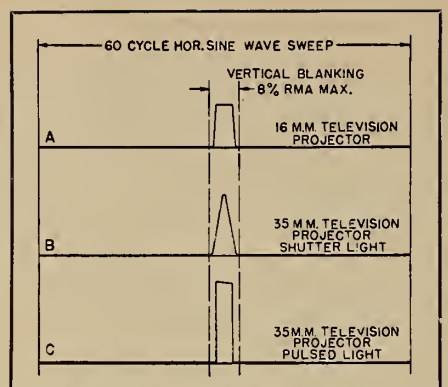


FIG. 7. Light-pulse comparison.

blanking and scan the picture in complete darkness.

Two possible methods of obtaining the proper showing time are charted. In line (*B*) the first showing interval can be shortened to accommodate two blanking intervals for the projection of the first frame, and the second frame can be held for a longer time to accommodate three blankings as indicated. In such a manner two exposures are made of one frame and three of the successive frame. Thereby we have made five television fields out of two frames of 1/24 sec. each. This gives us 60 television fields or 30 television frames p.s. from film running at 24 frames p.s.

Clever Bit of Trickery

This 2:3 ratio of picture projection, a very clever piece of trickery, is described in U. S. Patent 2,082,093. Light pulses for the Iconoscope are produced by a rotating shutter properly phased, with the television system using a high-intensity light source.

The other method shown in line (*C*) charts conditions with a very short pull-down time interval. If this is made approximately 50 degrees as indicated, it allows two showings to be centered in one frame and three showings in the successive frame without resorting to any change in time ratio of the intermittent mechanism from frame to frame. U. S. Patent 2,303,960 describes this alternative method.

The design of a 35-mm television projector with a fast pull-down (such as 50 degrees) does not appear practicable because cutting the allowable time in half increases the acceleration forces by four times. These forces would exceed the elastic limit of the film; the mass of the film in this case represents the major part of the load. Therefore, the 2:3 ratio intermittent represents a good solution to the problem.

35- Mm Intermittent Mechanism

This type of intermittent mechanism is used in the Brenkert *BX*80 theatre projector which is being built by Brenkert for RCA. The standard theatre Geneva movement is shown functionally in Fig. 5. A driveshaft turns the cam, with its single drivepin, at 24 r.p.s.; each revolution of the cam turns the four-point star wheel 90 deg. and the picture moves one frame.

The television intermittent designed for the *BT*90 projector is shown with a special cam divided in the ratio of 2:3 and driven at a reduced speed of 12 r.p.s. to maintain 24 r.p.s. at the sprocket shaft. The star now has three points to give the faster pull-down necessary because the cam pin speed has been halved. The sprocket has also been modified to have 12 teeth instead of 16. Since the angular rotation has increased to 120 degrees, the film travel is maintained at the same rate as previously used; *i.e.*, four sprocket holes to advance the picture one frame.

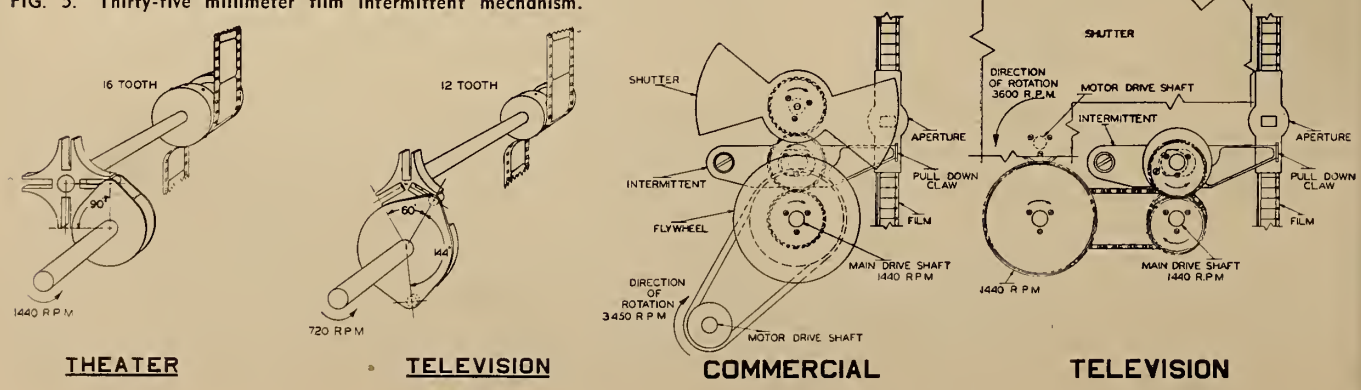
16-Mm Intermittent Mechanism

Our 16-mm projector intermittent problem (Fig. 6) has been solved by increasing the nominal 65-degree pull-down of the RCA PG201 projector to approximately 45 degrees to accommodate the necessary picture exposures in the manner shown in line (*C*) of the time-cycle chart of Fig. 4.

The designer, in an ingenious solution, has applied elliptical gears which are interchangeable with the existing

FIG. 6. Sixteen-millimeter film projector intermittent mechanism.

FIG. 5. Thirty-five millimeter film intermittent mechanism.



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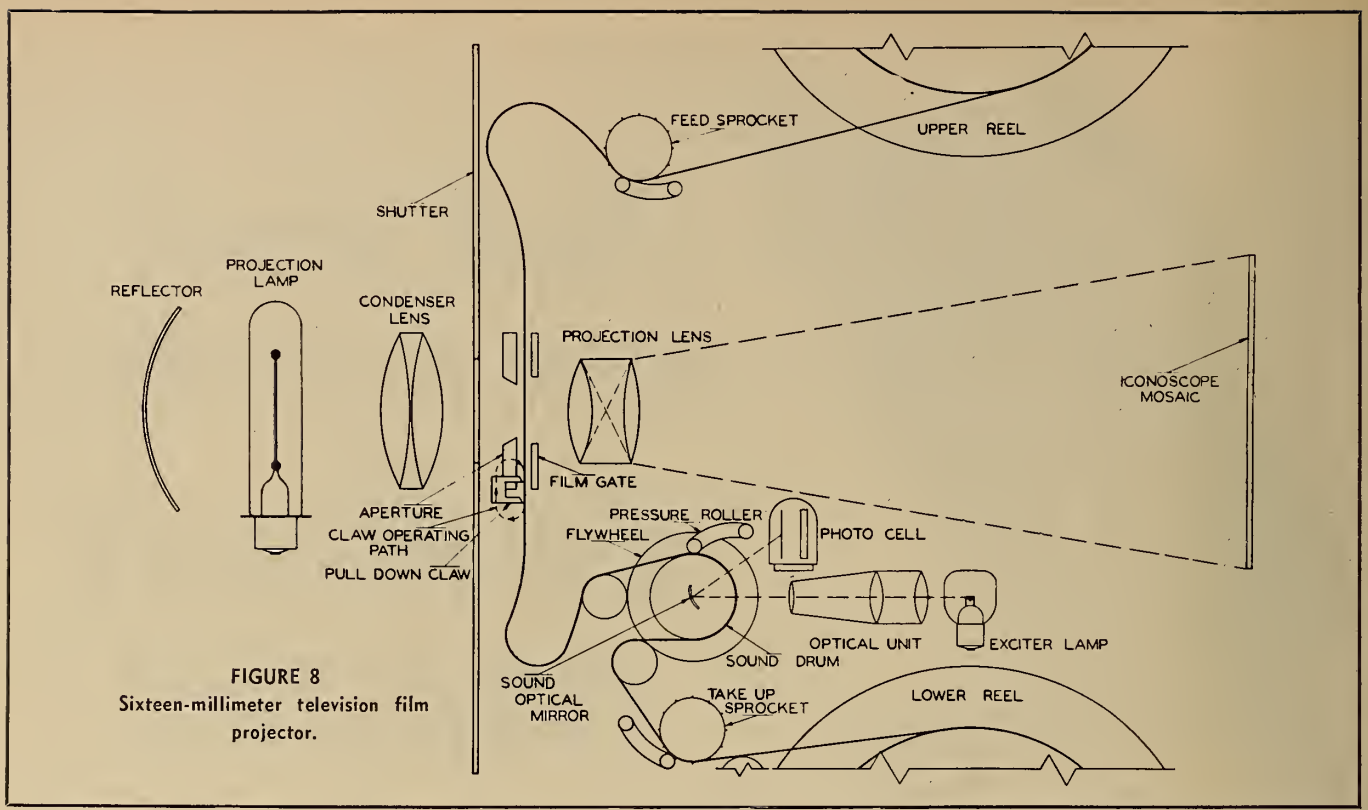


FIGURE 8
Sixteen-millimeter television film projector.

spur gears. In effect, the gear ratio is variable so as to give an almost 2-to-1 speed change which is sufficient to make the pull-down 45 degrees. The pull-down action is phased with the fast half-cycle of the elliptical gears so that the propelling motion is then the product of the normal cam action and the elliptical gear action. The time gained on the pull-down stroke results in a retarded return stroke which reduces the strain and vibration in the mechanism.

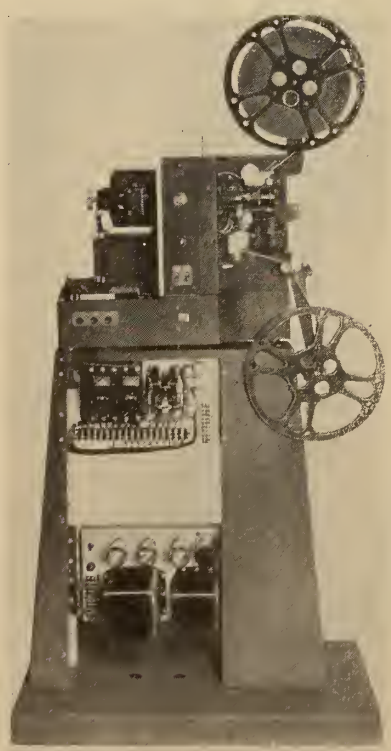


FIG. 9 (left): Covers removed from RCA tele projector.

FIG. 10 (below): View of tele projector mechanism.



Design of the intermittent mechanism represents the solution to the first of three projector functions peculiar to television. The second problem is the light source and the method of accurately timing the duration and repetition of projected light. An adequate light source for the Iconoscope must be capable of producing approximately 40 ft.-c. average illumination on the mosaic with no film in the machine. The duration of projection time must be 5% or less with a repetition rate of 60 p.s.

There are two methods of meeting the light requirements: first, an adequate light source with a shutter can be made to give accurate timing of the projection interval; second, a type of light source which can provide the correct illumination by switching this source on at the proper instant and for the correct exposure duration.

The first method has been used in previous television projectors and is the one used in our 16-mm television projector because of its simplicity and low cost. The second type of light source requires a lamp which can have its illumination cycle instantaneously controlled. Until very recently it has not been possible to obtain a practical source having the control, the light intensity, and life for this purpose.

The shutter for the 16-mm projector is located where the cross section of the light beam to be interrupted is small compared with the shutter opening used; by this method we have a fast opening and closing and a considerable region of full opening time. The shutter is located immediately behind the aperture plate so that light and associated heat are on the gate only during the actual exposure interval.

Nevertheless, a light source operated by an electronic switch would be an ideal solution; the short duty cycle of 5% would conserve power and greatly reduce the heat. It is certainly logical to turn the light on when it is needed rather than to keep it on continuously and waste 95% to obtain the 5% pulse by a mechanical shutter.

Early experimenters attempted to modulate a carbon-arc source with little

(Continued on page 33)

Complete Projection Data Charts

By ROBERT ALLEN MITCHELL

The second in a series of seven articles providing data forms which, when filled-out to a reasonable degree of completeness, afford a comprehensive and accurate description of the individual installation.

II. Lamp and Carbon Data

FORM 2, presented herein, includes the salient features of the arc lamp and the characteristics of the carbon trim. Fill out the form in pencil, *not* in ink, as changes may be desired later. Enter the most obvious and easily determined facts first; then attend to specific details.

1. ARC LAMPS. Under "Type" mention whether the unit is a high- or low-intensity arc, and if "high" whether it is of the Suprex-type. Strictly speaking, there is no such thing as an "intermediate intensity" arc lamp. The term "intensity" as applied to an arc refers to the manner of light production and to the brightness of a unit area of the positive crater. In the low-intensity arc the light comes from white-hot carbon; while in the high-intensity type it emanates mostly from a crater-covering film of ionized carbon gas.

A square millimeter of the crater has approximately the same intrinsic brilliance in all arcs of any one type, regardless of amperage and size of trim. Contradictory as it may seem, a high-amperage, low-intensity lamp may give more light than a low-amperage, high-intensity lamp.

"Optical system" refers to the light-collecting and converging system: mirror, mirror and converger, or condensing lenses, as the case may be.

Under "Position of Carbons" mention the inclination of the negative to the positive, if any, and also the inclination of the positive from the vertical or horizontal. The remainder of Section 1 requires no special comment.

2. OPTICAL. The "true focal length" of a reflector may be learned by writing to the manufacturer. It may be determined in the projection room to within ¼ inch by the following method:

Focus the arc on the projector aperture in the usual way. Now move the arc forward or back until the spot on the aperture cooling plate is as small and sharply defined as possible. Switch the arc off, and when the carbons are cool, very carefully measure the distance (1) from the positive crater to the center of the mirror, and (2) from the center of the mirror to the cooling plate (not the aperture, itself). Then use the following rule or formula:

RULE: *To find the focal length of a mirror* divide 1 by the crater-mirror distance in inches. Divide 1 by the mirror-cooling plate distance in inches. Add the two quotients. Divide 1 by the sum so obtained. The result is the focal length of the mirror in inches.

FORMULA: d is the distance from positive crater to mirror; D is the distance from mirror to cooling plate.

$$F = \frac{1}{\frac{1}{d} + \frac{1}{D}}$$

[*NOTE*: In mathematics 1 over a quantity is called the *reciprocal* of that quantity; thus the value of F in the above formula may be defined as the reciprocal of the sum of the reciprocals of d and D.]

The curvature of projection lamp mirrors is not strictly spherical, for the curvature decreases slightly toward the edges. Such a "figure" is called *parabolic*. If mirrors were figured *spherically*, we should not have to be very fussy about the mirror-aperture distance, but the spot would be blurry, and the fade-away of light toward the edges of the screen would be intolerable.

To overcome this defect (spherical aberration) the reflector manufacturer "parabolizes" his mirrors. Now, the degee of parabolization required depends on the focal length of the mirror and its working distance from the aperture. For this reason the mirror must be positioned to within one millimeter of its proper distance if the best light is to be obtained.

If the mirror be too far away from the aperture, the effect is that of an under-parabolized mirror; if too close, the effect is that of an over-parabolized mirror. In the latter case, the picture may even be brighter at the edges than in the middle of the screen, a highly unsatisfactory condition. The focal length of a mirror combines with the diameter of the positive crater and the size of the aperture to limit the mirror's maximum distance from the aperture; for every projectionist knows that if the mirror be too far back, it is impossible to focus the spot down to a reasonably small size. Too large a spot causes an enormous waste of light and heats the head excessively.

Because focal lengths and degrees of parabolization of different mirrors of the same size sometimes vary, the competent projectionist should not hesitate to readjust the mirror distance by "trial and error" until the point is reached where the brightest and most even illumination is obtained on the screen.

The equivalent focus of a glass lens condenser assembly is determined in the same way as the focus of a mirror. Employ the distances crater-to-collector and converger-to-cooling plate. It may be remarked here that a condensing lens system is not so sensitive to slight errors of adjustment as a mirror system.

Section 3 requires no explanation. It may be used for recording data on either rheostat or relay-type arc controls.

4. ARC AND CARBON TRIM. Under "Carbons" mention whether cored, type of coating, *etc.*

Arc gap length may be expressed either in millimeters or fraction of an inch, whichever is preferred. Numerous recommendations have appeared in the literature regarding correct gap length, but the projectionist will know from experience what length gives the best results with his particular trim and current.

Methods of determining arc voltage. resistance, *etc.*, were discussed in the first article of this series. This information may be taken from Data Form 1A or 1B.

Carbon consumption in inches per hour may be determined in the following way: (A) Measure the length of a positive carbon in inches. Note the exact number of minutes it is burned during the running of a film. Measure the length of the carbon again. Then apply the following rule or formula:

RULE: *To find the hourly consumption of a carbon* subtract the final length of the carbon in inches from the initial length. Multiply the difference by 60. Divide the product by the number of minutes of burning. The

result will be the carbon consumption in inches per hour.

FORMULA: L_1 is the original length of the carbon; L_2 the length after burning; t the time of burning in minutes:

$$X = \frac{60(L_1 - L_2)}{t}$$

(2) Repeat the process for a negative carbon.

The time in minutes in which one inch of carbon is consumed is found by simply dividing 60 by the hourly consumption rate.

FORM 2: LAMP AND CARBON DATA

Theatre _____
City _____
State _____
Theatre Circuit _____

Date _____
Revised _____

Chief Projectionist

1. ARC LAMPS

Type: Intensity _____
Optical system _____

Position of carbons _____

Make & model _____

Number of lamphouses _____

Serial Numbers of lamps:
Proj. No. 1 _____
Proj. No. 2 _____
Proj. No. 3 _____
Proj. No. 4 _____

Size & part No. of positive clamps or feeders _____

Size & part No. of negative clamps or feeders _____

Feed, automatic or manual _____

If high-intensity, does positive carbon rotate as it feeds? _____

If high-intensity, is negative feed adjustable with relation to positive?

Arcoscope indicator view of arc direct or reversed? _____

Number of sight glasses per lamp _____

Size of sight glasses _____

Lamp switches:
Type _____
Number per machine _____
Location _____

Pilot (service) lamp & switch:
Type bulb _____
Type switch _____

Remarks _____

2. OPTICAL

Reflectors: (If condensing lenses are used, omit this section.)

Make & part No. _____

Outside diameter _____

Diameter center hole _____

True focal length _____

Mirror-positive crater distance _____

Mirror-aperture distance _____

(If converging lens is used with reflector, answer the following):
Make & part No. _____
Diameter lens _____
Focal length _____
Distance from mirror _____
Distance from aperture _____

Condensers: (If reflectors are used, omit this section.)

Make & part No. _____

Diameter of collector _____

Focal length of collector _____

Diameter of converger _____

Focal length of converger _____

E.F. of assembly _____

Collector-crater distance _____

Converger-aperture distance _____

Remarks _____

3. ARC CONTROLS

Type of control (rheostat or relay)

Make & model of assemblies

Serial Numbers of assemblies:
Proj. No. 1 _____
Proj. No. 2 _____
Proj. No. 3 _____
Proj. No. 4 _____

Fuses: Type _____
Rating _____

Specifications of rheostats or relays

Make & model of motors _____

Serial Numbers of motors:
Proj. No. 1 _____
Proj. No. 2 _____
Proj. No. 3 _____
Proj. No. 4 _____

Specifications of motors:
Volts _____
Amps. capacity _____

How is rheostat or relay connected with motor? _____

How is control connected with arc?

Remarks _____

4. ARC AND CARBON TRIM

Positive carbons:
Type _____
Size _____

Negative carbons:
Type _____
Size _____

Arc gap, length _____

Arc voltage (drop) _____

Arc resistance _____

Arc current _____

Carbon consumption, inches per hour:
Positive _____
Negative _____

Number minutes in which one inch of carbon is consumed:
Positive _____
Negative _____

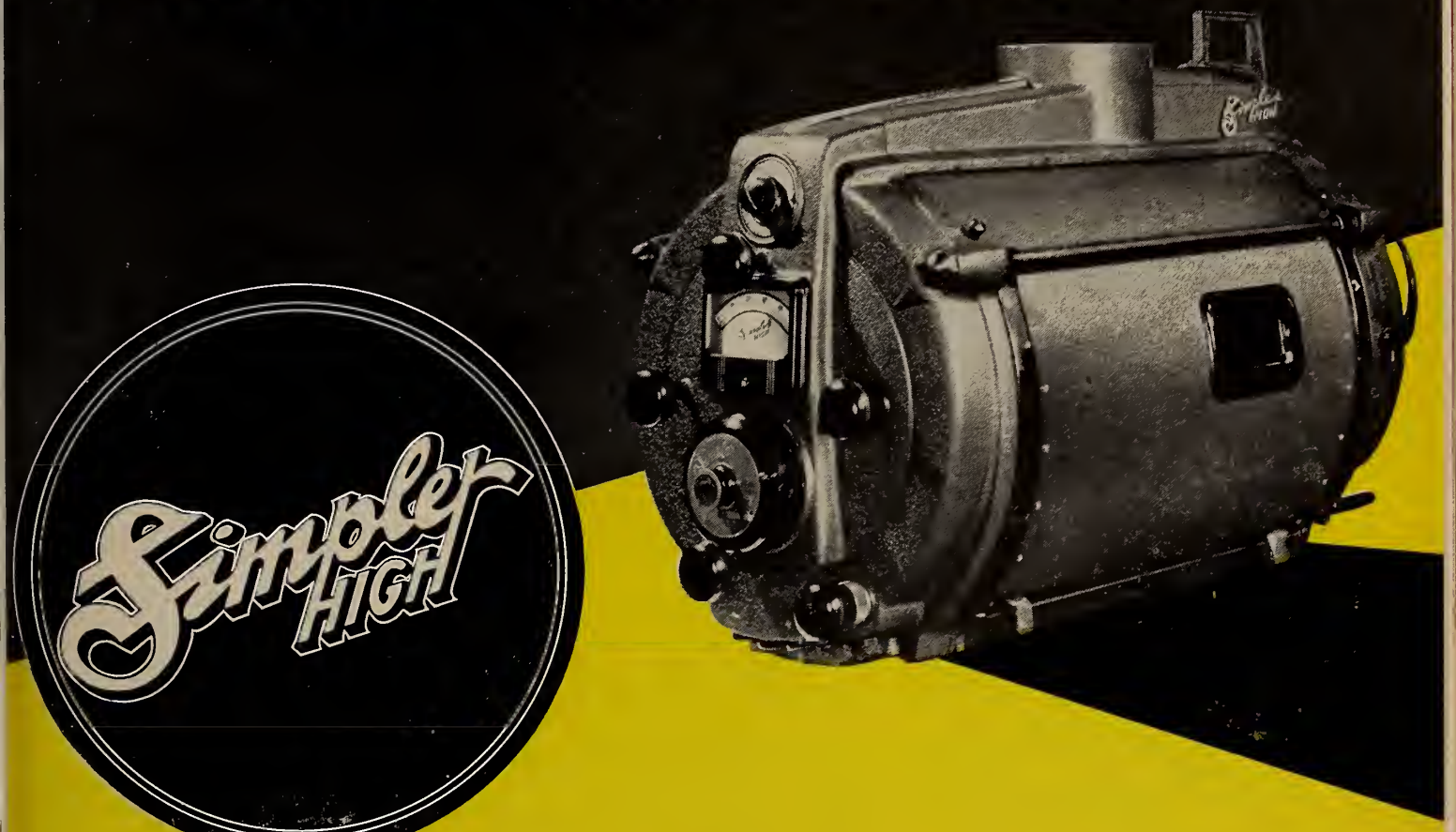
Shortest stubs usable for:
10-min. reel { Pos. _____ Neg. _____
20-min. reel { Pos. _____ Neg. _____

If carbon savers are used, give details _____

Remarks _____

5. SPARE EQUIPMENT

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PROJECTION ARC LAMPS

—deliver the snow-white light essential to satisfactory projection of Technicolor. Low intensity light is yellow by comparison and changes the color values.

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Addendum: 'Quality' vs. 'Pleasing' Sound Reproduction

Readers will remember the provocative article under the above title in I. P. for February. This article originally appeared in Electronic Engineering *(London), a contribution of J. Moir, acoustical engineer for the British Thamson-Houston Co., Ltd., of Rugby, England. Excerpts from letters of several correspondents to the British technical journal are appended hereto, together with Mr. Moir's comments on the various suggestions advanced.*

By G. R. REDGRAVE
Gaadman Industries, Ltd.

MR. MOIR concludes that the average listening public does not like "top" in reproduced music. This is a debatable point . . . Far more evidence must be produced before it can seriously be suggested that the mass of ordinary listeners might prefer to have less "top" in the live performance. . . . Members of a concert audience do not complain of excessive high-frequency content in the music, nor, for example, would the reception of a "break" on the solo trumpet by an acknowledged master of that instrument suggest that the hearers are in any way dissatisfied.

As for the development of the violin, cited by Mr. Moir in support of his suggestion, it is indisputable that the best violins ever produced are those made by Stradivari, who died over 200 years ago. Surely, if improvement of this instrument was possible or desirable, we should have observed some indication of it in the meantime, particularly in view of the greater knowledge of acoustics and wider choice of materiels available in latter years. . . .

Mr. Moir admits his findings are based on the results of listening to reproduced music, and we can only conclude, therefore, that there was something present in the reproduction which would not have appeared in the original; or, in other words, that the apparatus suffered from a form of distortion.

Equipment Procedure Queried

We are particularly surprised that no mention was made of the transient response characteristic of the apparatus used in the experiments. It is our experience that equipment designed purely from the standpoint of achieving a good frequency response characteristic can sound most unsatisfactory; but, for example, a loudspeaker that has been designed for a good transient response curve is always a good loudspeaker, and, incidentally, is found also to possess a good frequency response curve.

Finally, anent the engineer, surely there can be no question that his job ideally is to provide perfect reproduction of the studio performance. In practice he should aim to achieve results as near to this as the development of his art will allow.

Deliberately to attempt anything else is to encroach on the territory of musicians and of craftsmen of musical instruments, but insofar as the engineer is handicapped—whether by limitations of his technique, by imperfections of the materiels, or by shortcomings of the media of his calling—he may be compelled to abandon his ideal.

'Highs' Are More Distressing

He must also be guided by the fact that the general public cannot be interested in wide-range reproduction if this entails the usual disadvantages, as the human ear is more readily distressed by distortion products in the higher frequencies than elsewhere. This being so, a limited frequency range reproduced well will always be more generally acceptable than a wider range involving imperfections, and is therefore permissible as a temporary expedient until such time as the imperfections can be eliminated.

By F. SLATER

Mr. Moir's article, while indicating new and interesting lines of thought, left one unconvinced that the old ideal of perfect response had been fully explored in his investigations. Much more is neded to be known about the equipment used.

If, for example, the higher notes were allowed to radiate from one or more baffle-loaded loudspeakers, the following points could be raised: baffle-loaded speakers focus the higher audio frequencies, an effect which is unnoticeable with the normal domestic receiver, but which immediately assumes a major note when the frequency response of the amplifier is extended. This effect surely becomes more and more obvious as the response is opened up.

Speaker Type Important

Equipment with baffle-loaded speakers, even where three or four are arranged to cover a wide angle, suffer from this effect and the consequent sharply-defined multiple reflections which result in reduced realism.

With two similar extended reponse amplifiers—one coupled to a baffle-loaded speaker, the other to a horn-loaded type—it will be found that the high-frequency beam from the former has a much greater relative strength, and a greater annoyance value. It also intensifies the "point source" impression, being stereophonically less satisfactory than a baffle speaker coupled to an amplifier having a moderately restricted high-frequency response. The horn-loaded type, due to absence of focusing, shows none of these effects when the higher frequencies are reproduced.

To me the reduced stereophony due to "point source" effect, and the interference patterns due to high-strength reflected beams, are as much a substantial form of distortion as those more easily measured.

By B. C. SEWELL
Gainsborough Pictures, Ltd.

These attempts . . . have met with difficulties often ascribed to the prevalence of high-frequency distortion factors in film recording, but which probably have a more fundamental basis, as Mr. Moir's evidence suggests. The requirement of speech intelligibility demands a certain minimum high-frequency response, but this requirement is fairly easily met; and beyond this point the criterion is that of "naturalness."

The evaluation of data regarding "preference" assumes a clear-cut distinction between the reproduced and directly heard performance. It must be assumed of critical listeners, (including, naturally, musicians) that they automatically adopt a different set of fundamental values when assessing a reproduced performance as opposed to a "live" one. This, I believe, is because the acoustic coloration is so greatly modified that the performance has not the illusion of reality and cannot be judged by the same standards.

Stereophonic Reproduction

One is tempted to think that the table of preferences might have been greatly modified if the reproduction had been stereophonic, thus permitting the functioning of the normal auditory facility of directional perception.

In orchestral recording it is often found that delicate passages—from woodwinds, for instance—have insufficient value when reproduced through

(*Continued on page* 28)

TELECASTS

WITH facilities in the radio spectrum for only one system of color television, the FCC has ruled that further experimentation was essential and denied the petition of CBS for approval to permit commercial operation of color television stations on the basis of the sequential system developed by it.

In a 14-page decision the commission commended the advances made in the development of color television by CBS and expressed the hope that experimentation would be continued by it and others to the end that "a satisfactory system can be demonstrated at the earliest possible date."

Inadequate Field-Testing

"The commission cannot escape the conclusion that many of the fundamentals of a color television system have not been adequately field-tested," the ruling continued.

"Before approving proposed standards, the commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards.

"Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless."

The commission voiced the opinion that there might be other systems of transmitting color which offered the possibility of cheaper receivers and narrower band widths that have not been fully explored.

'One Integrated System'

"In television the receiver and transmitter are in effect components of one integrated system, or, expressed in another manner, the transmitter and receiver are related to each other, as a lock and key. Unless they are both designed to meet certain fundamental standards, the receiver will be unable to accept the transmissions from the transmitter.

"The method proposed by Columbia is the sequential method. RCA has proposed as an alternative the simultaneous method. Still other possibilities exist.

"Receivers that are built for the sequential system would not be able to receive programs from television stations broadcasting on a simultaneous system or on another system."

RCA, which had been in the forefront of those opposing the CBS proposals, had no comment to make on the FCA decision. However, J. R. Poppele, head of the Television Broadcasters Association, said:

"The public can expect the production and manufacture of television receivers to be accelerated greatly and the number of applicants for commercial black and white television stations to be increased materially during the next few months."

* * *

SMPE Television Peeve

Sensing either a hesitation or a procrastination on the part of the motion picture industry to face the facts, at the same time "confidently aware of the inevitable future of theatre television," the SMPE is pressing vigorously its petition now before the FCC for adequate frequency bands to assure free and open channels for nation-wide television transmission to theatres when the need for that service arrives.

Unified Industry Vital

SMPE officials have stressed the extreme importance of a unified industry co-operation with the SMPE in soliciting these frequency allocations to forestall any competitive and conflicting requests of the FCC which might tie up the air, with no bands held in "escrow" for the picture business.

Whether this unified co-operation and participation should be by joint action of existing bodies or by some new governing group, dedicated exclusively to theatre television projects, is the principal concern of the SMPE at present.

* * *

Telecast Surgery Technique

The first telecast of an actual operation to test its practicability as advanced surgical teaching was presented recently by the Johns Hopkins Hospital in co-operation with RCA. Representation of the closed circuit telecast was restricted to receivers on the operating floor, as the feature was designed for doctors only.

Two supersensitive Image Orthicon cameras were used. One was mounted on the operating room light fixture directly above the operating field, thus permitting a detailed view of the operation. The second camera, equipped with a telephoto lens, was set up in the gallery of the ampitheatre. The camera directly over the operating table was pre-set and was controlled automatically. A microphone above the table permitted the surgeon to comment as the operation was carried out.

Ten RCA receivers, including the new 10" direct-view table model and two large projection screen models enabled 300 doctors to view the operation. Consensus of medical opinion was the results were highly gratifying and indicate a possible modification in surgical teaching.

* * *

New RCA Video Projection Screen

Television pictures on projection-type home receivers, 2½ times brighter than earlier large-screen pictures, are now possible by RCA's newly-developed screen. This screen will be used in RCA's projection television receivers scheduled for commercial distribution this year. The large pictures of greater brilliance provided by this screen are expected to extend television's usefulness in public places, schools and auditoriums, in addition to its use in the home.

The screen is based on a new application of plastics. Incorporated in a console type receiver, it presents a picture 15 x 20 inches, about the size of a standard newspaper page.

The images shown compare favorably in brightness with those obtained by a direct-view tube and, states RCA, "we are not aware of any commercial projection type of receiver which will produce a brighter or clearer picture than that which is obtained from the combination of this screen with the type of optical system used by us."

* * *

Video Receiver Set Estimates

8,998 television sets have been manufactured during Dec. and Jan., the Jan. output of 5,437 being almost 2,000 over Dec. production, according to the Radio Manufacturers Assoc. It is estimated, with Feb. figures, that more than 16,000 new sets are in homes or in hands of dealers. About 2,000,000 black-and-white receivers will be produced during the next three years, Dr. W. R. G. Baker, director of Engineering Dept. RMA, and vice-president of G. E., told the FCC.

IN THE SPOTLIGHT



By *HARRY SHERMAN*

WHAT is reported to be the first agreement calling for a company-financed health and welfare insurance program for its employes is the union contract recently signed between the Allegheny-Ludlum Steel Corporation and the United Steel Workers of America. The two-year agreement, which calls for a wage increase of 12½c an hour for 10,000 employes, also provides each worker with a $4000 life insurance policy in addition to a $4000 accident policy, and coverage for sickness, hospitalization and surgical benefits. Families of the workers are covered on hospitalization, including maternity care.

According to the financial statements issued by the motion picture industry, many of whom reported NET profits of from $19.000.000 to $44,000,000 in one year, a similar program for their employes should not impose too great a burden. We believe this plan deserves careful consideration by our Local Union officials.

• John Winslow was elected business agent of Minneapolis Local 219, defeating Wallace Yutsy. Claude (Bud) Hubbard, former business agent of the Local, resigned from office to be near his mother who is ailing in California.

• Frank McBrien, projectionist at the M-G-M Studios in Hollywood and member of Local 165, was a recent visitor to the offices of I. P. Frank is a former business agent of Local 483, Elgin, Ill., and is pretty sharp on the many ramifications of unionism. His observations on craft activities were very enlightening, and one of these days we will expand upon them.

• Crellen Champney, secretary and business agent of Local 739, Redding, Calif., would like to hear from other I. A. Local Unions with a view to an exchange of examination questions and answers for projectionists. A little cooperation in this direction will help a lot. How about it, boys?

• I. A. delegates to the Alabama State Federation of Labor Convention were tendered a luncheon by the officers and members of Birmingham Local 236. The luncheon was held at the Roberts Field Airdrome and the guests included many civic officials.

• Our heartfelt thanks to Tom O'Brien, General Secretary of the British National Association of Theatrical & Kine Employees (NATKE) for the honorary membership bestowed upon us. To the Executive Council and the members of this fine organization we also extend our thanks for this honor.

• Al Moulton, financial secretary of Boston Local 182 for the past 30 years, resigned from office and all union activities. He plans to take things easy and devote more time to his private affairs.

• Charlie Vencill, the aggressive secretary of Los Angeles Local 150 is devoting much of his time these days to the forthcoming National Conference of Union Labor Legionnaires, slated to be held at the Alexandria Hotel in L. A. May 23-25. Charlie is national president of this organization of war veterans and plays an important part in all its activities. Incidentally, he recently was made an honorary member of that well-known 25-30 Club.

• The estate of the late James W. Hancer, who died several years ago from injuries received fighting a fire in the projection room of the Gregory Theatre, Gregory, S. Dak., was awarded $8500 by a U. S. District Court jury in an action brought against the owner of the theatre. The latter was charged with negligence in failing to provide proper fire protection in the projection room of the theatre. This verdict should make theatre owners sit up and take notice of the fact that they share a legal as well as moral responsibility in the safety of their employes.

• Nothing daunted and despite five setbacks in as many years, I. A. Locals in the State of Rhode Island have introduced for the sixth time in the State Legislature a bill calling for a two-man shift in every projection room. This bill

GENE ATKINSON RECEIVES GOLD HONORARY LIFE MEMBERSHIP CARD IN 25-30 CLUB

Representing the 25-30 Club of New York City, Harry Sherman presented Gene Atkinson, Chicago Local 110 business manager, with a gold honorary life membership card in the Club. Witnessing the presentation were, left to right, Bill Kunzmann, National Carbon Co.; Harry Sherman; Gene Atkinson; Herb Griffin, vice-pres. of International Projector Corp.; and Cecil Woods, vice-pres. of the 25-30 Club and member of New York City Local 306. The presentation ceremonies took place in the offices of the Chicago Local.



has been bitterly fought by theatre exhibitors in the state who contend that the two-man shift would prove too great an operating burden for them to carry. Naturally, their chief interest is centered in profits and not in measures to protect the safety of the theatre-going public.

Perhaps if all other labor unions within the State Federation joined forces with the Rhode Island I. A. Locals, the state lawmakers might see the logic of this bill and realize that they are supposed to represent the interests of all the people in the state and not of just a few theatre owners.

• I. A. President Walsh is expected to take a trip to Europe in the near future to repay the visit last year of Tom O'Brien, General Secretary of the British NATKE. Talks between Walsh and O'Brien should bring forth results of great interest to the craft on both sides of the Atlantic. Incidentally, O'Brien is now en route to the U. S., being scheduled to arrive May 23.

• The application of a Boston night club operator for a permit to show 16-mm pictures in addition to the regular show was flatly rejected when the city's fire chief testified that the running of motion pictures in a night-club is a definite fire hazard. Like many other non-technical people in this industry, the night club operator contended that 16-mm film was acetate, non-inflammable and, therefore, did not come under the same regulations as the showing of 35-mm nitrate film. For the benefit of the uninformed, we suggest they refer to an article that appeared in I. P. for February 1946, p. 15, "Acetate vs. Nitrate Issue Revived," for an illuminating discourse on the subject of so-called "non-inflammable" film.



ROWLAND LONG, CHICAGO LOCAL 110 RADIO 'HAM', CONTACTS BLAST-STRICKEN AREA

Rowland Long, member of Local 110 and amateur radio operator, played an important role in transmitting messages from people in blast-stricken Texas City to relatives and friends throughout the country. Seated at his radio station, W9NLP, which he built in his home, and working closely with the chief radio engineer of the Chicago Police Department, Long cleared more than 50 communications. Mrs. Long, shown in the picture above, assisted him in relaying the messages.

• Since neither the newspapers nor the trade press made any mention of the services donated by the theatrical employes of the Texas I. A. Local Unions for the sufferers of the Texas City disaster, we should like to do so. The members of these Locals gave generously of their services at all performances held for the benefit of the blast victims. The people working backstage and up in the projection rooms may not be as glamorous as those performing in front of the footlights, but they are just as warm-hearted and generous and as quick to respond to an appeal for help as any other branch of show business.

• Three officials of Local 186, Springfield, Mass., won a decision in a court action brought against them by Joseph Giard, who was suspended from the Local for six months and assessed $180. Giard's charges against the officials of the Local—Ben Hull, Louis Williams, and Arthur Payette—were based on his suspension and the assessment. He also charged that his suspension was due to a letter he had written to I. A. President

(*Continued on page* 30)

L. D. (Larry) Strong Dies

L. D. (Larry) Strong, founder and owner of Essannay Electric Mfg. Co. of Chicago, died at the age of 58 years on Sunday, April 27. Death was caused by a heart condition induced by a stroke suffered shortly after his return from Florida late in January.

Born in South Bend, Indiana, Larry Strong went to Chicago 35 years ago. Known to few was the fact that after a brief contact with the motion picture industry, Larry was paymaster for a large Detroit automobile manufacturer. But the lure of show business



was too strong and he quickly returned to the projection field.

Essannay's early manufacturing activities were conducted in the basement of the Strong home in Maywood, Illinois, and subsequently on West Madison St., Chicago, where Strong perfected the famous Zipper Changeover for simultaneous switching of picture and sound which is today standard equipment on most projectors and adaptable for all. Other Strong products include a universal rewind mule, reel-end signals, and film cement—all manufactured in a modern factory employing 15 people at 1438 No. Clark St.

Strong was a member of the so-called "State-Lake Trio" of projectionists which, working together at that house for many years, saw the development of the famed "State-Lake policy" of vaudeville and pictures. The other members of the trio were two present officers of Chicago Local 110: Gene Atkinson, business manager, and Clarence Jalas, secretary.

Very active in the affairs of Local 110, Larry was also a member of the S.M.P.E., of Theatre Equipment Manufacturers Assoc., and of Chicago's Svithiod Club. He is survived by a daughter and a sister.

Essannay Electric Mfg. Co. will continue to manufacture and market the full line of Strong products through the medium of a most efficient staff to whom has been delegated an increasing measure of responsibility and authority in recent years.

TESMA-TEDPA Fall Convention at Shoreham, Washington, Sept. 24-29

The largest display of motion picture theatre equipment ever held is promised for the joint TESMA-TEDPA trade showing scheduled for the Shoreham Hotel, Washington, D. C., Sept. 24-29 next. Roy Boomer, TESMA secretary, states that an area accommodating 100 booths has been reserved for the show.

A prospectus showing the exhibit space will be mailed shortly to members of both groups and to unaffiliated manufacturers. A special effort will be made to enlist projectionist and exhibitor interest in the show. Requests for information anent the show should be addressed to Roy Boomer, 4356 Washington Blvd., Chicago 24.

Producers and exporters of soundheads, sound systems, motors and associated reproducing equipment are invited to list their wares with Yo Kim Tjan, Passar-Baroe 93, Batavia-Contrum, Dutch East Indies.

Evolution of the 16-mm Sound Projector

SIXTEEN years ago, in April, RCA introduced the first 16-mm sound film projector. First to overcome, in the early thirties, what was then commonly considered the insuperable obstacle of putting sound on the narrow 16-mm film, RCA went on to score many significant "firsts" in this field.

RCA's first innovation was 16-mm film with one row of sprocket holes which reserved the other side of the film for the sound track. The film was adopted as the American standard, and later was made a world standard.

The small area available for sound was further complicated by the fact that 16-mm film runs at only 36 feet per minute against 90 feet per minute for 35-mm film. This slower speed further reduced the linear space available to only 40 percent of that on 35-mm film.

New 'Dry' Galvanometer

RCA's answer, in 1928, was a revolutionary new "dry" galvanometer, part of a greatly improved optical sound recording system. Outstanding feature of the new galvanometer was a mirror 15 times larger than previously used for sound-film recording. The new mirror cast light of much greater intensity and made possible an optical system of high resolving power. This, in effect, was the finer "paint brush" necessary to get good resolution of the hair-fine lines on the tiny 16-mm track. The greater light intensity also permitted the use of finer-grain film, resulting in even better resolution.

In addition, RCA concurrently developed a magnetic film drive for sound recording which provided smooth and oscillation-free passage of the film through the recording light. A corresponding improvement in the reproduction of sound in the projector was also made possible by RCA's "rotary stabilizer" which passed the film at smooth and steady speed through the projector, ironing out speed variations which previously had made all pianos sound out-of-tune and introduced "guitar effects" into all music.

Another early source of unnatural noises in 16-mm sound was a "cross-modulation wave" which freakishly arose to distort the legitimate sound. This "photographic distortion" was overcome by a means for compensating in the print for the distortion in the negative, a process now a "must" in all recording for both 16-mm and 35-mm variable-area sound tracks.

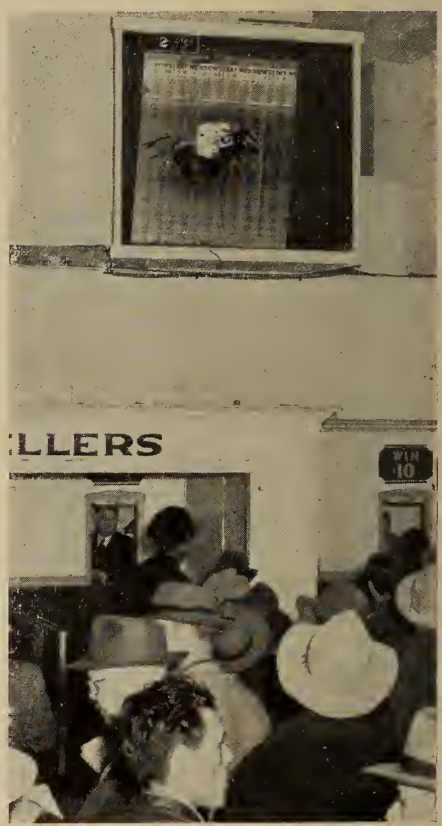
Still another source of interfering noise was graininess in the film texture, and dirt and imperfections on the sound track which registered as hissing, crackling and "frying" noises. RCA blanked out this static and chalked up a notable "first" in noise reduction by devising an automatic biasing system which, during low-level passages, keeps the clear area of the track no wider than needed at the moment to record the sound.

International Standards Set

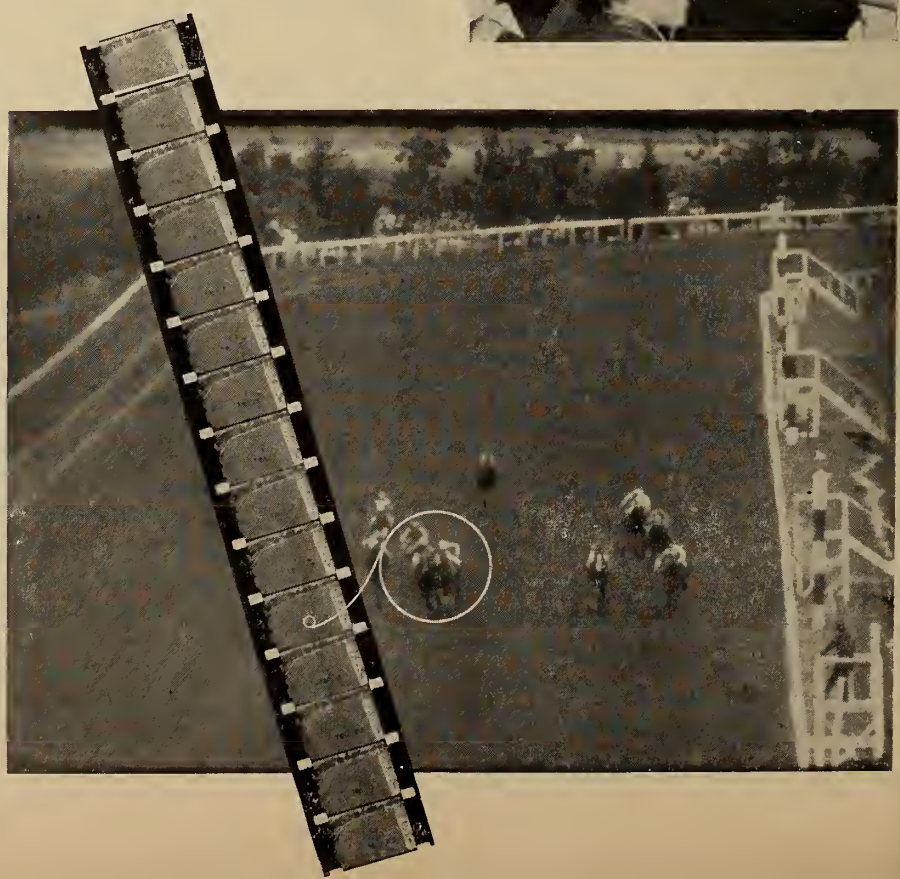
RCA's first 16-mm sound projector inadvertently led to a peculiar international incident that eventually involved the diplomatic machinery of the League of Nations itself. Viewing the newly-born RCA projector, the Germans, then very much in the 16-mm sound steeplechase, abandoned their own efforts and adopted the RCA specifications. However, in picking up the diagrams as published in the SMPE *Journal*, the good Deutschers interpreted one small detail backwards. The result was fantastically exhibited at an early exposition in Paris when it was revealed, for all the world to behold, that the German-adapted projectors ran the titles of our standard 16-mm film backwards! Likewise, German-made film

MOVIES PROVE WORTH AT BAY MEADOWS TRACK

Right: This photo-finish picture on the translucent screen ot Boy Meadows shows a deod-heot, with Lucio's Son and Sir Bob tied for the win. No question as to proper placement decisian with this system. No ather meons could possibly shaw this finish with such exoctitude as this motion picture frame. But laok below for an example of startling camera detective work.



Below: The motian pictures, projected immediately ofter the phota-finish shot, showed this foul which resulted in decloring Lucio's Son the winner, despite the dead-heot finish. Single frames are studied when there is suspician af o rule violotion, becouse patrons knaw that the comero "sees all".



run in our projectors showed the titles as though seen in a mirror.

Unwilling to junk their huge 16-mm investment, the Germans refused to bow to the standards set up on the basis of the American-made equipment.

After preliminary jockeying in the Education Committee of the League, the issue was carried to the International Standards Association, where the problem was finally solved by appointing the Germans as secretariat of the committee. This "neutralized" the Germans and judgment was inevitably rendered in favor of the American equipment.

Reproducing sound from a film track requires an intense beam of light in the form of a sharp line less than 1/1000 inch wide! In 1932 RCA came up with a radically different sound-reproducing optical system, the heart of which was cylindrical lenses which have the peculiar ability to produce a line image of the incandescent lamp filament directly on the film. The new lenses enable a more uniform image at the film, using an economical low-power lamp in its projector. The small lamp could be operated from an oscillator built into the amplifier, producing a high-frequency current which lights the lamp without any flicker.

Ordinary projectors used large, high-powered lamps, passing the light through a slit to narrow the image, which wasted practically all of the light. The only practical way of lighting the large lamps was by 60-cycle current, which produces flicker, which in turn is reflected as hum in the loudspeaker.

In 1934 RCA further improved 16-mm sound by designing an optical-reduction printer for making 16-mm prints from 35-mm negatives. This produced 16-mm prints of finer quality than the "re-recording" method then in general use.

A novel RCA 16-mm camera was introduced in 1935, taking pictures and recording sound simultaneously on a single film.

Meanwhile the search for an even finer "paint-brush" for applying sound to film tracks continued. The trouble with the white light then used was that it penetrated the film emulsion and "scattered," spreading the exposure and unduly thickening the fine lines of the sound track. A problem with 35-mm film, it was even worse in the more exacting 16-mm recording.

Finally, in 1936, RCA provided the solution—ultraviolet light. Instead of completely penetrating and scattering, ultraviolet light was absorbed before penetrating more than a minute distance into the emulsion, localizing the exposure to the *exact area* struck by the recording light beam. The benefits to 16-mm recording were manifold.

In 1938 RCA introduced the "electronic mixer" or "compressor," by means of which the full range of sound was "compressed" onto the 16-mm track, making the weak sounds loud enough to be distinct without making the loud sounds of such amplitude as to overload the track.

At about this same time, casting previous threading arrangements aside, RCA designed a much simplified projector threading arrangement which featured large 16-tooth sprockets and passage of the film in wide curves and long flowing lines to end crimping and tearing.

In 1942, RCA 16-mm models PG-200 and PG-200A, included a satisfactory design of slipping-clutch take-up which assured proper tension regardless of the amount of film on the reel.

During the war years, the unusual requirements of field use led to RCA's development of the "closed-cavity" loudspeaker. Rugged conditions imposed on 16-mm equipment demanded a loudspeaker, weather-tight, small sized and which would improve the radiation of lower tones. Overcoming the difficulty of "cavity" resonance, RCA in 1943 mastered this problem.

New Motiograph Drive–In Sound System

MOTIOGRAPH announces two drive-in theatre sound systems with central loudspeaker systems having a power output of 75 and 150 watts, respectively. For the use of in-car or post-type speakers, Motiograph offers three additional systems of 150, 250, and 500 watts of power output. The largest system will handle the power requirements for more than 1800 cars. This system has emergency provision permitting operation at 40, 250, or 500 watts.

The in-car speaker is of heavy gauge drawn steel, plated and finished in light blue enamel. The front side has a perforated area over the speaker unit cone. The rear side has a special rubber covered hook for support at any desired position in the car. A constant-impedance volume control is mounted in a recess in the front side, its operating knob being well protected from damage during handling. The heavy-duty, moisture-proof connection cord is six feet long; the hook design provides a place to wind it up for storage.

The speaker is weather-proofed, the cone being water-proofed and the metal parts treated to resist corrosion. The speaker unit itself is larger than most comparable units. Characteristics of this unit are exactly matched to the acoustical characteristics of the speaker housing, resulting in exceptional tone quality.

Speaker Shelter, Junction Box

The SE-7535 in-car speaker shelter and junction box is designed on the same principle as rural mail boxes. It has a flanged metal base section which may be mounted either on a 2″ pipe post or on a standard wooden fence post. The ends are slotted to permit the speaker cords to hang downward. Terminal blocks are provided near the center for the speaker and feed cables, and the impedance matching transformer for two speakers is adjacent to them. Transformers are available with any desired primary impedance up to 14,000 ohms.

Speaker shelter compartments and a center transformer compartment are provided by the formed metal cover for the base section. It has flanged and hinged doors at either end and fits snugly down over the base section to provide entirely adequate weather protection for two SE-7530 in-car speakers. With the supporting posts properly located between each two car positions, the speakers may be taken out of or be placed in the shelter compartments without the necessity for getting out of the cars. Provision is also made for clamping two speakers to the sides of the shelter box to give the patron even quicker access to the in-car speaker.

The transformer circuit is so arranged as to prevent accidental speaker cord shorts from disturbing other speaker pairs on the same ramp feed line.

Unsheltered speakers may hold up for a season or two in mild climates, but best professional engineering opinion is that replacement costs will be very heavy thereafter due to cone failures, to corroded metal parts, particularly the iron and steel components in the speaker unit magnetic structure, and to general deterioration caused by exposure to the elements.



SE-7535 speoker shelter ond junction box, mounted, in closed position. It is to be noted thot Motiogroph does not furnish the iron pipe nor concrete bose pictured here.



SE-7530 In-cor speoker unit with cord, steel coble, ond plostic covering.

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

VI

ONE of the guilds which early played a part in London's activities was the weavers. They had been organized long before they secured a royal charter. The Charter gave them a control and jurisdiction supported by the royal authority which they had not previously enjoyed. In return for their charter they paid a rent, or ferme, annually to the king.

As one result of these charters the citizens no longer enjoyed individual sway in London and the other cities where guild charters had been granted. It is not surprising that for several centuries there existed a constant active conflict between the craft guilds and the combined merchant guilds and burghers, both groups striving for power. On many occasions the turmoil, and the methods as well, resembled the anti-union activities of our modern citizens' alliances and merchants' and manufacturers' associations. Probably the issues involved then and today are much the same.

Weavers' Charter in 1110

The weavers of the medieval period were famous for the quality of the cloth they made and were among the first to secure charters on the continent and in England. There was a weavers' guild in Spire in the early part of the twelfth century, one in Mayence in 1099 A. D., and one in Worms in 1114 A. D., of which there are authentic records.

Henry I of England chartered a London weavers' guild about 1110 A. D. It was the beginning of a long contest between the guild and the burghers, who had support from the city corporation. The burghers opposed the establishment of this craft guild with vigor and sometimes questionable activities.

The contest lasted until the fifteenth century, when the weavers' guild firmly established its supremacy. English kings found it advantageous to play one against the other, and to keep the citizens divided. This conflict between the two groups supplies a good example of the struggle between the rapidly growing guilds and the body of the old citizens.

Craft Jealousies Stirred

Under Henry I (1100-33 A. D.) the weavers were given a charter which, among other rights, provided that:

"Nobody except by them shall introduce himself, within the city, into their mystery, and nobody within Southwark or other places belonging to London except he be a member of their guild."

These privileges were confirmed by Henry II. This gave the guild a monopoly, for no non-guild weaver could work in London. It enabled the weavers to maintain a fixed price for their product, and exempted them from control over their internal affairs by the city corporation.

This exemption, this freedom from the jurisdiction of city authorities over the guild's internal rules and regulations, stirred the jealousy of the other citizens to such a degree that they made continual protests to the king. Finally, in the reign of King John, a royal promise was made to the angry citizens "that the guild of weavers shall not from henceforth be in the city of London, neither shall be at all maintained."

The crown had received 18 marks in money per annum as rent, or ferme, from the guild. King John provided that the citizens "should pay 20 marks in money per annum as a gift" instead. As usual, when the crown had the power it profited financially.

Guilds vs. Government

This suppression of the weavers' guild proved ineffective. The guild was far from helpless. Insisting that the rights granted them by Henry II were still valid, they stubbornly contested their position. The London burghers continued to buy the cloth they wove, as it was largely their only source of supply. In Belgium and Germany efforts to eliminate the weavers' guilds proved equally ineffective.

During the reign of Henry III (about 1221 A. D.) the weavers of London and the other cities were again embroiled in a serious conflict. Madox, in writing of this strife, relates:

"The weavers of London, fearing that the mayor and citizens of London should extort from them their charter and liber-



To the Editor of I. P.:

I was recently reading in I. P. (an issue I missed while adorning the roll of Company A of the 413 Infantry) that prints average about 200 runs before being retired. I have a trailer relative to our special week-end shows which has been in use since last October: I figure it has run three times daily for 213 days, a total of 639 runs.

I don't expect that this is a record-breaking film run, but I think you will agree that the enclosed sample shows that the print still is in very good condition. Incidentally, the film is now only about 12 ft. long, which means that it has 768 sprocket holes. Since I trim off four holes a week (two cuts on each end) it is obvious that within 192 weeks I shall be without film.

Of particular interest to me are those articles in I. P. relative to Hollywood studio technique: the Technicolor process story was very good. How about one on the film editor's job, and also process projection and special effects work? I. P. is tops for the boys; keep up your fine work for the craft.

DOUGLAS R. FRAZER
Auditorium, Marshall, Missouri.

• Given equipment up to snuff and careful handling, 639 runs is not an extraordinary film run; yet even six runs on defective equipment or careless handling can ruin even a new print. Prints in long-run de-luxe theatres often run 700 and more times, but here the important angle is that they are subjected to the heat of a high-intensity arc six times daily.

Mr. Frazer's sample film strip is in excellent condition, attesting to high professional standards of projection. It undoubtedly would be interesting to hear about some really long print runs (no whoppers, boys).

As for articles on studio technique, I. P. has long adhered to the notion that projectionists should have a well-rounded knowledge of all phases of production as well as reproduction. But, judging by the difficulty experienced by publications catering strictly to production activities, those studio mugs are too busy making technological history to write about it. Only the sound recording boys are the least bit vocal, and with them it's a disease not an occupation.—ED.

To the Editor of I. P.:

Would you please enlighten me as to the limits of error in the E. F. of standard projection lenses tolerated by leading lens manufacturers?

R. M., Dallas, Teras.

• The limit of permissible error in the E. F. of standard projection lenses is 1 per cent, plus or minus. If there be a greater deviation, the lens barrel is marked to indicate the exact tolerance of the lens, thus permitting matching of a pair of lenses. This practice is adhered to by all reputable manufacturers. —ED.

ties granted to them by King Henry II, delivered that charter into the exchequer, to be kept in the treasury there, and to be delivered to them again when they should want it, and afterwards to be laid up in the treasury."

As late as Edward II (1320 A.D.) the weavers' privileges remained a bone of contention between them and the city corporation. In time the city gave up its efforts to suppress the guild, for the weavers were essential to the city's welfare, and they refused to surrender their organization, neither threats nor intimidation moving them.

The experience of the London weavers' guild was repeated many times in connection with other guilds elsewhere in England and on the continent.

The craftsmen were free men—citizens. They believed in organization as their only means of self-protection. They were proud of the skills they had acquired and were determined to maintain their unions as their only safeguard from exploitation by nobles, by merchant guilds and by city corporations.

There was a contest in Exeter, England, during the 14th century which vividly pictures the conflict between a guild and the city. The tailors held a royal charter, but had been unsuccessful in bringing all the tailors into their guild. It was guild and non-guild tailors in competition, with the latter working for lower prices. This led to constant brawls in the taverns and on the streets. The two groups opposed each other with more than words.

The non-guild lower prices pleased the citizens who, nevertheless, were irked because of the constant clashes between the organized and unorganized.

Guild Charter Revoked

Believing that the source of the continual disturbance could be eliminated if the guild tailors could be shorn of their charter, the city corporation sent representatives to London to urge the king to annul it. After several efforts, the order annulling the guild's charter was signed. Two royal commissioners carried the order from London to Exeter. Upon their arrival, heralds blew their trumpets in the city square. The document dissolving the tailors' guild was read. The citizens were gratified, and the non-guild tailors probably felt that they were being rewarded for their non-unionism.

That evening the city corporation gave the king's commissioners a banquet with an abundance of "cakes, pastry, venison and ale," as shown by the city's rolls for that year.

We can almost see the non-union tailors gathered in some tavern, talking of the friendship the good burghers had always shown them, the support their non-unionism had received from the city corporation, and now the king had intervened in their behalf. Tomorrow they would thumb their noses as the guild tailors walked by.

In the City Hall the banqueters probably exchanged the customary speeches. The commissioners congratulated the city fathers upon at last having rid themselves of the pestiferous tailors' union, while the mayor applauded the king's action.

Everybody was happy at the moment: the citizens because they would now have their clothes made more cheaply; the city corporation because the tailors' charter had been made worthless; the town constables because they would have fewer street fights to break up; the non-guild tailors because their non-unionism had received royal approval—and last by no means least, the guild tailors because they had reached a self-satisfactory determination.

'Settle' Jurisdiction Tangle

While the banquet was in progress the guild tailors met in their guild hall. With their charter annulled, they were now "on their own." They would not have been loyal craftsmen had they thrown up their hands in despair. They highly resolved to maintain their organization and to rid themselves of the non-guild tailors. Arming themselves, they sallied forth, attacking every non-union tailor, collecting them in groups, and then driving them out of the city with the warning that if they valued their physical safety they would never return.

When the banqueting city fathers and the king's commissioners got out of bed late the following forenoon, they discovered that the guild tailors, without their charter, were more dominant in craft activities than they had been with it. Again strong, virile craft organization had fully held its own.

[To be Continued]

LOCAL 110 PLAYS HOST TO PROJECTION MEN ATTENDING RECENT SMPE CONVENTION

Assembled at Chicogo Local 110 offices were, seated: Horry Sherman, International Projectionist; Gene Atkinson, business monager, Local 110; Herbert Griffin, vice-president, International Projector Corp.; James J. Gorman, president, Local 110.

Center: Dave Joy, National Carbon Co.; John E. Behlke, Local 110; Frank Galluzzo, vice-president, Local 110 and president of TMA; George Holl ond Joe Coscioni, members Local 110; Sam Klugman and Chas. B. McNeill, members Local 110 executive boord; Charles Dentelbeck, supervisor of projection for Famous Players Canadian and member of Toronto Local 173; Ralph Mooney, Local 110; Nate Golden, Motion Picture Division, U. S. Dept. of Commerce and member of Cleveland Local 160.

Reor: Harry Hollonder, New York Local 306; Charles Funk, Local 110; Cecil R. Woods, Sr., vice-president 25-30 Club and member New York Local 306; John Burns, Local 110; Wm. C. Kunzmann, National Carbon Co., and L. Kenneth Moyer, Manufacturers Machine & Tool Co.



Plan 36,000 Portable 16-mm Automatic Sound 'Theatres'

Plans to establish 36,000 portable 16 mm. "theatres," featuring free entertainment features and educational short subjects, to be set up in retail outlets, hotels, terminals, club rooms, schools and churches, is revealed with the anonuncement of the formation of the Portable Theater Corp., Hollywood, Calif.

Company claims that a large quantity of self-contained portable theatres, with fully automatic projection and sound, are now being manufactured, with initial deliveries beginning on April 15. Plan envisions continuous programs, changed weekly, with sponsored advertisements presented between the entertainment and educational films.

Project is seen as a means to attract and hold increased store traffic and to assist in leveling out peak business hours. National advertisers, it was said, have co-operated in the development of the free movies plan.

20th-Fox 1946 Earnings

Estimated consolidated net profit of 20th Century-Fox after tax deduction for the 52 weeks ended Dec. 28, 1946, is $22.600,000. compared with $13,746,467, for the 1945 period. Total is an $8,853,533 increase.

The '46 figure is equal to approximately $7.90 per share on 2,756,462 shares of common stock outstanding Dec. 28, 1946. Common stock outstanding for the 1945 period amounted to $2,119,709 shares. Earnings in 1945 were equal to $5.29 per share. Above figures are applicable after deduction of dividends on prior preferred and convertible preferred stock.

The company's gross income before taxes from sales, rentals and theatre receipts for 1946 was given as $190,300,000, compared with $178,211,889 for the previous year.

Presenting: George H. Jones



IGNORING the traditional route of breaking into show business by hanging around the local Opry House, George H. Jones actually went to school to learn how to operate a motion picture projector. This was in Manchester, England, where he was born in 1885, and where at the age of 14 he was apprenticed to the wholesale grocery and provision business. The "school" featured a Pathe machine with no top magazine, and a clothes basket "caught" the film.

While showing a film of Canada which glowingly pointed up its many opportunities, young George was smitten with the urge to "come out" and try his luck. He did, landing in Toronto in 1913. His first job was to crank a Powers 6 with one hand while with the other he rewound and spliced the film. All this happened within a steel cabinet four feet wide. Salary: $15 for a 54-hour week.

The advent of motor-driven equipment marked the introduction of song slides plus an interpretive (?) singer. Printed with special ink on a glass slide, the longest popular song refrain was "When You Wore a Tulip". The show consisted of a three-reel feature, a one-reel comedy, and songs—for five cents admission.

Mr. George Do-It Does It

In 1915 George organized a union of 66 projectionists under Canadian Government charter. A year later this group amalgamated with the Toronto I. A. Local, thus forming Local 173. The following month George was elected to the Executive Board, and in 1917 he was named Secretary by acclamation. Later he held the combined office of Secretary-Treasurer. George was a delegate to the first convention of the 11th District held in Montreal in 1919.

George is the Mr. Do-It in matters affecting Local 173 members' security and general well-being. Authorized in 1930 to invest $5000 in Dominion bonds, he wound up by subscribing $25,000. All interest and profit from this venture went into a sick fund for the members, who received $20 weekly. In 1931 a group insurance plan amounting to $2000 per member was adopted. Compulsory for every member today, this plan has netted policy beneficiaries $56,000 to date.

During the depression years he administered a fund for the unemployed which netted them $20 weekly, based on a 3% assessment levied on working members. To lighten the charity tinge each unemployed man worked nine days free each year.

The Call of the Wild

That which George pumped long and strenuously for in 1943 is today accomplished through the cooperation of Famous Players Canadian Corp.—life insurance of $2000 per member, two weeks vacation with pay annually, and consideration for loyal company workers in times of illness or other distress. They let George do all these things—and he does them.

Out-of-doors exerts a strong pull on George, such as fishing for small-mouth black bass at his summer place on Head Lake which takes in two acres of woodland. That's what always happens, it seems, to these guys who are married to a wonderful gal for 28 years (a professional nurse, by the way) and have a lovely daughter. George brags about his expert status with the cross-cut saw, so we hope all you guys (preferably from the Northwest Douglas fir country and the California redwood area) ship him tons of logs (collect) and make him prove it. The guy is also a photographic bug, having won a couple prizes for such endeavor.

George is proud of the fact that he never asked for a vote for any position during his lifetime, his stand being that a fellow gives all he has to give—and that's it, win, lose or draw. Nothing much else about George Jones except that he has represented Local 173 for 30 years in the Trades and Labor Council, is a director of the Toronto Labor Temple Co., and for the past 25 years has been assistant business manager and still is the Secretary-Treasurer of the largest I. A. Local in Canada. Nothing else, that is, except that he's a great guy and the fact that they're nuts about him up Toronto way.

Army Air Force Film Program Essays Giant Strides Forward

The most serious limitation on aerial photography is that set by the net maximum obtainable resolving power of about 40 lines per mm., reports the Army Air Force. This is inadequate for photography at extremely high altitude and points toward the need for improvement in sensitized materials, optical equipment, camera mounts, shutters and printers.

Improvements in optical systems are limited by the theoretical resolving power of the lens used, which in turn is ideally a function of lens diameter and wave-length of the light. Other characteristics needed in new lenses are extremely wide angle of view and freedom from distortion for high-altitude precision mapping.

New ideas in the field of sensitized materials are: films coated on very thin bases for savings in bulk and weight; new color films with improved dyes yielding fidelity of color reproduction, color duplicating materials, new color paper materials, high-speed infra-red sensitive materials, and panchromatic films with speeds up to Weston 800.

Cameras, Illuminants, Electronaids

New cameras and electronic systems for transmitting images from aircraft to the ground will be needed. These cameras must be remotely controlled from ground or air stations. One answer to the problem of precision mapping from extreme altitudes is the development of large mapping cameras and large plotting instruments capable of accepting the large negatives or positives produced.

Future requirements for night illuminants call for the development of intensities of illumination 10 to 100 times that of present equipment and materials. The possibility that nuclear energy can be used for such intense illumination should be investigated. Continuous processing in the future may be accomplished by the dry processing method or by gaseous development. Hot processing liquids will be investigated.

National Carbon Expands Field Force By Adding C. E. Heppberger

National Carbon Co. announces the appointment of C. E. Heppberger, of its Chicago division office, to the Technical Specialists Group. This group acts with projectionists and distributors on the scientific aspects, best utilization, and unusual applications of the carbon arc for projection in all kinds of existing and new equipment.

A graduate of Ohio State U. in 1931, Mr. Heppberger joined National Carbon Co. in 1940. He entered the Navy in 1943, and returned to National in Jan. 1, 1946.



C. E. Heppberger

Others in this group are C. W. Handley, in the West; Paul D. Ries, in the East, and Bill Kunzmann, who covers nation-wide general activities. The group is directed by Erwin Geib from the Cleveland office.

The Temple Where Liars Go to Pray

NO less applicable than the penetrating observation that the divorce court is a temple where liars go to pray is the following editorial comment in *Tele-Tech* magazine:

> The radio electronic art is largely based on patents. There are many cases of patent litigation constantly in our courts, yet how many learned judges sit in these courts who know a transformer from a rheostat? In many instances their decisions must be based on nothing more scientific than whether they like the cut of the defending lawyer's coat or the appellant's smile!
>
> Either special patent courts should be established, or judges should appoint qualified technical advisors, who would handle the technical testimony and help the court arrive at its decision.

'Nuisance Value' Routine

No industry has suffered more through such abuse than that of motion pictures, particularly in those years following the introduction of sound film. What technician can forget those days when certain large corporations, their files bulging with thousands of patents—some good, some bad, and many representing merely "nuisance value"—swooped down on a progressing independent and choked him into extinction by sheer weight of patent pressure.

The routine went something like this: assume a case concerning any type of glass envelope, the "trust" would first sue on the overall basic principles. Being knocked down on this (as almost invariably they were) the big boys would then sue on the method of sealing-in; then on the length of the filaments and their juxtaposition; then on the base, and so on *ad infinitum* even to the extent of the *degree* of vacuum present in the bulb. (The latter actually happened!)

Survival of the Fittest?

After this series of legal sorties, the independent, fortified only by a puny bankroll and an indomitable but misguided courage, his business neglected, was reduced to financial penury and utter distraction—a soft touch for the "sale" of his little business, for a fraction of its real worth, to the large outfit which had not won a single court decision! In passing, it might be noted that the "nuisance patents" played a major role in this really criminal extension of the legal process.

The *New York Times* has suggested editorially on several occasions the placing of all patents in the public domain, with the patentee being forced to grant licenses to all who could satisfactorily meet certain conditions of manufacturing standards and a set royalty figure applicable to all. Need it be said that nothing ever came of this sensible suggestion?

Tele-Tech's suggestion anent "qualified technical advisers" for patent case judges is strictly n.g.: the "adviser" almost invariably would be a former employee of some outfit in the field in which a given patent were applicable, or he would cherish the idea of future lush employment either as a straight payrollee or as a "consultant." So-called technical experts are a dime a dozen, comparable in this respect with psychiatrists and handwriting experts, all of whom dredge up "evidence" favorable to those who retain them.

Career Engineers as Judges

The answer, as I. P. sees it, is the appointment of a professional career engineer as a judge with a lifetime tenure of office. Such a judge could then call the shots as he saw them from his vantage point of long training in his particular field.

The patent law as written and administered today is nothing but a racket which operates to favor strongly the large corporations who have nothing but money with which to build up their patent holdings, often spy on new developments at the point of origin, and employ staffs of lawyers who do nothing but harass Joe Independent—the overall expense of which department is reported to the stockholders under the euphemous heading of "legal expense."

The qualifications for a patent case judge are a non-lawyer, less law, and more knowledge of science.—VERITAS.

DeVry in Production on New Theatre Amplifiers



SHOWN here are two new DeVry theatre amplifiers now in full production and available immediately. At the left is Model 2820, specs on which are: Output—30 watts at peak, 20 watts at 2% distortion based on SMPE standards. Taps at 8, 16 and 500 ohms. Input—two high-impedance p. e. cell inputs with means for balancing projector outputs. Microphone and phonograph jacks. Range—plus or minus 1 db from 50 to 10,000 cycles. Tubes—one 5U4G, two 6L6's, one 6N7, one 6SF5, one 6J7. All standard low-cost, easily replaceable tubes.

Controls—master volume control, h. f. control, l. f. control, and two screwdriver-type p. e. cell voltage controls. Monitor—an 8" p. m. monitor speaker with its own control is mounted over the amplifier. Operating Voltage—105-125 volts, 50-60 cycles A.C. Other frequencies on request. Dimensions—22 x 19½ x 10½ inches for easy wall mounting. Capacity—adequate for serving 1,000 persons.

At the right is the Model 2823 embodying two 30-watt amplifiers mounted in one cabinet, one unit being for standby.

I. A. Elections

LOCAL 164, MILWAUKEE, WIS.

Glenn C. Kalkhoff, *pres.;* Walter Behr, *vice-pres.;* Otto Trampe, *bus. mgr.;* George Wittman, *treas.;* Robert Lucht, *sec.;* George Brader, Frank DeLorenzo, John Black and Norman Habersat, *executive board.* Kalkhoff, Trampe and Behr, elected del. to I. A. Convention. Kalkhoff and Trampe elected to represent Local 164 at the State Federation of Labor Convention to be held in Green Bay, Wis., August 1947, Karl Miller and George Harris as alternates.

LOCAL 277, BRIDGEPORT, CONN.

Roland J. McLeod, *pres.;* Frank Toth, *vice-pres.;* Leroy Nickerson, *fin.-sec.;* Fred Lewis, *treas.;* John A. Martin, *bus. agent;* Thos. E. Colwell, *rec.-sec.;* John C. Lynch, *sgt.-at-arms;* Harold Ryckman, John Benard, Frank Gorman, Merrick Parrelli, *executive board;* Leslie C. Blakeslee, James Liburdi, Ernest Gilbert, George Antoniak, and Merrick Parrelli, *trustees.* Peter Benard, John Benard, John Connor, Joseph Cink, and James Leverone, elected *del. to Central Labor Union;* John A. Martin, Roland J. McLeod, *del. I. A. Convention.*

Hollywood 'Art' on a Peon Level

A direct quote from the discerning Red Kann in *Motion Picture Herald*:

"In 1946 approximately 86 per cent of a total wage of $6,926,265 went to producers, directors, writers, actors and actresses making pictures for RKO. 95 individuals drew a combined $2,698,124 in salaries of $20,000 and better but not exceeding $50,000. 34 others were paid a bulk $2,252,192 in wages of more than $50,000, but not more than $100,000 each. There were a dozen who drew above $100,000 per man or woman for another aggregate $1,975,949.

"This conveys a pretty clear picture of how the boys and girls work at peon levels in the name of Art."

The foregoing deserves sole dead-center positioning on the first pages of those annual reports to stockholders which often "report" such engaging data pictorially as the "Labor Cost" segment of a wheel purporting to show where the dollar of income goes.

New Superior Binding Post

The new Superior binding post (Type DF30) meets the need for a multi-purpose electrical connector. In contrast to the usual connectors which permit only one or two methods of connection, the new Superior binding post offers five ways of connecting leads, as follows: permanent clamping of wire up to No. 12 through the center hole; looping of wire around the center shaft and clamping plug-in connection of a standard ¾-inch center banana plug; clip-lead connection by removing the hexagonal shaped phenolic head; and spade lug connection.

In addition to the versatility of connection, the new Superior binding post provides complete insulation of the post from the mounting panel. To assure rugged construction, extra-strong hard phenolic material is used for the head and sliding members. Employment of this material permits tightening of the hexagonal shaped head with a standard ½ inch socket wrench. All metallic components are recessed assuring a dead front for instrument and user protection. Current carrying capacity is 30 amperes. This new binding post is complete with all components ready to mount on any panel up to ¼ inch thick.

Further details available from Superior Electric Company, 453 Church St., Bristol, Conn.

800 Negro Theatres; More Due

About 800 theaters will be featuring Negro features by the end of 1947, it is estimated by producers of the films. Active booking lists include some 600 houses at present, including 50 which joined the ranks last year, and 200 theaters are expected to change over to Negro subjects during this year.

Some 90 per cent of the Negro film houses are located in the deep South with the balance located in metropolitan areas, with concentrations of Negro patrons.

Popularity in the South, however, has reached such proportions that dance halls and schools have installed portable projection and sound equipment in order to cash in on the trend.

'Fast Pitch' in N. Y. Insurance Rate Rise for Film Studios, Theatres

Insurance companies pulled a fast one on the film industry in New York State when a 25% increase in fire insurance rates for motion picture theatres and studios, brick-protected and fire-resistive, became effective on May 1. News rates were okayed by State Insurance Dept. because of the "considerable rise in replacement and repair costs . . . and losses being sustained in the affected classifications," of which theatres and studios are one unit.

There have been no "serious losses" in either theatres or studios in New York State for many years past, the film industry having compiled an outstanding safety record. But the rate boost sticks nevertheless.

Altec Services Mr. Verdoux

Charles Chaplin, a professional actor of some note, is a tough customer when it comes to equipment for a Broadway showing of his pictures—as Altec Service Corp. found out. Practically ready to open "Monsieur Verdoux" in New York, Chaplin discovered the setup had no "Voice of the Theatre" loudspeakers.

Result: a wire to the Altec Lansing Hollywood plant, feverish loading onto a plane of the speaker units, and their arrival at the Broadway stagedoor 36 hours later. The show opened the day following. "Verdoux." incidentally, had his snout in the projection room and backstage throughout the installation of visual and sound equipment.



Process backgrounds with

B&L Super Cinephor Lenses

FILMING technique often calls for projected process backgrounds instead of location shots. To obtain maximum edge-to-edge brilliance, contrast and sharpness in projecting backgrounds, many leading Hollywood photographers depend on Bausch & Lomb Projection Lenses. Only the finest quality lens could meet this tough test satisfactorily, because critically precise camera lenses pick up flaws in the projected image.

For sharp, brilliant pictures on your screen that pay off at your boxoffice, take a tip from Hollywood—use Bausch & Lomb Projection Lenses. Bausch & Lomb Optical Co., 616-E St. Paul Street, Rochester 2, N. Y.



BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.

STANDARD .943 INTERMITTENT SPROCKET PENDING

(Continued from poge 6)

tire area, and rupture occurs at the weakest point.

Experiments have indicated that double the number of projections could be obtained from films which are exactly centered on the intermittent sprocket compared with those which are only slightly misaligned.

Proper Gate Tension Vital

Of course, the tension in the film gate is a vitally important factor in the life of a given print. Tests indicate that the number of film passages varies from about 300 with a tension of 30 ounces to more than 3000 at 8 ounces and the latter was not run to anywhere near breakdown.

In the projector on which the aforementioned tests were run it was noted that there was no differences in steadiness of the screen image with tensions greater than about 4 ounces, but below this point there was definite unsteadiness. A survey of a number of theatre projectors showed gate tensions ranging from about 20 ounces to about 10 ounces. These two extremes in tension produce a five-fold change in the wear life of film.

Overall, the answer to the question "How many times can film be run through a projector?" appears to be "It will run as many times as we wish to make it run." If the pitch of the present intermittent sprocket (.935 inch) be altered so as to avoid the tearing action of the sprocket teeth against the film perforations, and if the questions of alignment and tension can be solved in cooperation with the projectionists, it is believed that most films are capable of delivering many times the number of projections they will ever be called upon to make.

The new standard .945 intermittent sprocket, together with the vast improvement that has been effected in the shrinkage characteristics of film stock, is expected to result in improved projection no less than in surprising conservation of both film and sprocket.

Accompanying this article are the opinions of representative 35-mm projector manufacturers with respect to the impending standardization of the .945-inch intermittent sprocket.

"Arctic Blanch" Screen Resurfacer Wins Praise in Buffalo Area

A new screen resurfacing process which, on the basis of a score of jobs already done, promises to be the first of such to be really effective and regain for a well-used or damaged screen a large measure of its original efficiency, has been developed by Ken Caldwell, a member of Buffalo (N. Y.) Local 233. Known as Arctic Blanch, the process is being handled by National Theatre Screen Refinishing Co., 129 Zenner St., Buffalo, 11.

There are two types of Arctic Blanch, one for regular type screens, the other for plastic types. One gallon of the preparation, used with a quart of thinner, suffices for covering a 15 x 20 ft. screen with two good coatings.

The screen is prepared for resurfacing by first vacuuming from the rear, plus the use of a brush attachment to dislodge dust or any material that may be unloosened by mere suction. All holes should be patched at the same time. Arctic Blanch, properly thinned to its proper consistency, is applied with a spray gun having a pressure of at least 40 lbs. so that no sound holes will be plugged.

The gun is held about eight inches from the screen, is used as though it were a paint brush, and the stroke is always to the right. Air is released from the gun following each stroke. Each stroke should be overlapped to avoid "stripes" or "clouds". The product drys extremely fast, thus the first coat is practically dry before the second is applied.

Artic Blanch has been used on practically every type of screen in the Buffalo area, including large Magnascope jobs, to the enthusiastic satisfaction of every client. Inexpensive, simple to mix and use, the product insures a tremendous increase in screen reflectivity without impairing sound transmission. A descriptive booklet is available.



1 Bod sound breeds oudience indignotion—results in refund demonds or stoy-aways.



2 Moy even close your theatre ot the peak of o smosh-hit run.



3 RCA Service is your sofeguard—your protection ogoinst sound breakdowns.



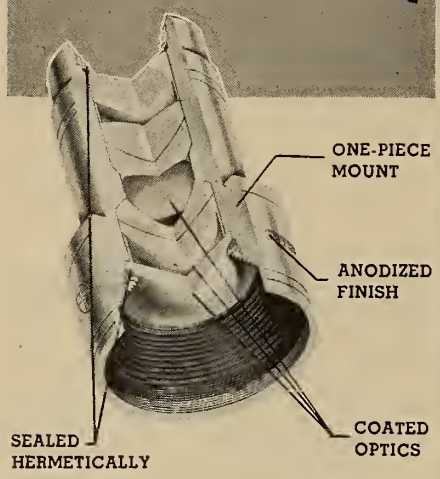
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Durable anti-reflection coating on each glass-to-air optical surface nearly *doubles* the light transmission ... gives brighter pictures, higher contrast!

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Exceptional speed for the utmost in screen brilliance without extra current consumption!

Super-Snaplite lenses are stocked in focal lengths from 2" through 5" in ¼" steps. Speed of f/1.9 is maintained in all focal lengths from 2" through 4½". Other Snaplite lenses include the Series I and f/2.0 Series II. For complete details on all Snaplite lenses, get Bulletin 203 from your local supply dealer.



KOLLMORGEN Optical CORPORATION
2 Franklin Ave.
Brooklyn 11, N. Y.

ADDENDUM: 'QUALITY' vs. 'PLEASING' SOUND REPRODUCTION

(*Continued from page* 16)

microphone and channel, although perfectly natural to a listener at the microphone position. By one means or another the sound energy from this section has to be increased. This may be the case even if the microphone is of a directional type, though more so if it is not.

Another aspect lies in the inability of the listener to distinguish, spatially, between the direct and reflected components, which must lead to a masking tendency absent, or less pronounced, in the natural conditions.

It seems as though non-aural reproduction deprives the hearing of a dimension, and that, as a result, the listener prefers a simplification of the material, accommodating it to the narrower compass of his perceptions.

Attenuation of Bass

The only non-complex sources of which data are given are male and female voices, and piano. The latter is not a fair test, the high-frequency components being small; but it is noticeable that preference is exhibited for wide- and medium-range reproduction for female and male voices, respectively. In the case of the male voice much depends upon the reproduction level.

It is probable that the attenuation of the bass in the narrow-range curve had a greater effect than the corresponding attenuation of the high frequencies, and the preference would have tended more towards the extended high-frequency response if the bass attenuation, which is a normal requirement in dialogue recording and reproduction, had been preserved.

By F. DUERDEN

There is a certain dislike of "top" even when the broadcast receiver is not involved. It is certainly true that harmonic content and unpleasantness are closely associated: for example, a scream or a circular saw at work contain overtones; a soprano song or the same saw running free contain sub-harmonics.

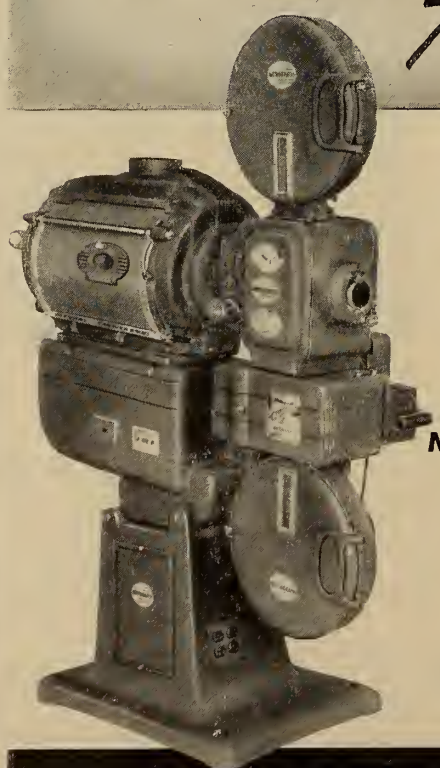
I don't think it is true that pure tones in the upper register are pleasant. The general rule would seem to be that the ear is intolerant of any high-pitched constant sound. Either sub-harmonics or frequency modulation are insisted upon.

The latter introduces an interesting line of speculation, since the frequency modulation introduced by a violinist is regarded as pleasant; but wobble in a singer is most unpleasant. What is the deciding factor?

J. MOIR (in Reply)

It is suggested that faults in the experimental technique were probably responsible for the surprising conclusion;

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and in view of the difficulties involved, this point cannot be entirely dismissed. However, the engineers responsible were of undoubted integrity and technical competence.

But, and this is of major importance, is the state of our scientific knowledge such that we can be certain that we know what defects to look for?

First-order distortions are probably evaluated by our frequency response curves, distortion measurements and phase characteristics, but at that point we arrive at the edge of an uncharted sea of ignorance. It is for this reason that the results of the violin tests were quoted, insofar as electro-acoustic reproducers were not involved in any way.

Medium Range Preferred

The agreement between the frequency characteristic of the preferred Stradivarius violins and the preferred "medium range" used in the frequency range tests is surprising. Thus, whether we use our electro-acoustic system of questionable distortion, or musical instruments of unquestionable performance, we arrive at substantially the same answer: a "medium" frequency range is preferred.

In conclusion may I suggest that the idea that we *ought* to like wide-range reproduction is probably based on the following:

(*a*) Analysis of musical instruments has shown that they produce "wide-range" noises.

(*b*) Analysis of the performance of the human hearing mechanism has shown that it can appreciate "wide-range" noises.

Measurements vs. Assumption

There is no authenticated support for any other argument, as far as I know, and while Mr. Redgrave *assumes* that listeners are not dissatisfied with a "hot trumpet," in the only case where we have *measurements rather than assumption* (the violin tests) listeners did in fact prefer the top removed.

I doubt whether the position is as clear as might be wished, but if the article serves to shake us out of the complacent acceptance of previous explanations of the public preference for minimum top response, it will have achieved its purpose. Further work is undoubtedly required (and is in progress) to confirm or contradict the conclusions put forward in the contribution.

410 Millions For Major Features

Total cost of the 277 feature-length motion pictures produced in 1946 by eight major motion picture companies is estimated at $410,000,000, according to the 1947 Film Daily Year Book. Average per feature is put at $665,863. Short subjects produced by the companies cost an additional $3,200,000.

In 1945, the companies spent $401,577,800, an average of $554,386, for their feature pictures. Approximately 100 additional feature films were made in Hollywood during 1946, but the cost of these "independent" pictures is not given.

Altec Service Sound Test Reel

In the article "Two New 35-mm Projection Test Reels" in I. P. for April (p. 10), the sound system test reel was erroneously credited to Altec Lansing Corp., and its use in future credited to the same company. This reel was developed and will be exclusively used by servicemen for Altec Service Corp., as pointed out by the latter's vigilant W. W. Simons.

Altec Lansing Corp., of course, is a manufacturing, not a servicing, organization, one of its noted products being "Voice of the Theatre" loudspeakers.



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DeVry IN-CAR SPEAKERS permit closed windows in bad weather; provide individual volume control to patron's taste; confine sound to immediate theater area, eliminating community complaints; give farthest-parked patron uniform synchronization of sound with action. Don't delay. . . . Place your order for IN-CAR SPEAKERS now and assure on-time delivery.



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For the Perfect Show Indoors or Out Your Best Buy is a DeVRY

IN THE SPOTLIGHT

(*Continued from page* 19)

Walsh protesting the Local's failure to admit his son, Leo, to full membership. In his letter to President Walsh he accused the Local officials of conspiracy against him and of altering Local Union records.

It was brought out at the court trial that a copy of Giard's letter to the General Office was read at a regular meeting of Local 186 and the members immediately voted that charges be preferred against him. These charges were heard before Local 186 executive board (trial board) and since Giard could not produce any witnesses or evidence to substantiate his charges against the officers, he was suspended from the local and fined $180, the costs of the trial.

Judge Leary, of the Superior Court, who heard the case rendered the following decision:

"I find that the allegations of conspiracy have not been sustained, and that no conspiracy or plan of concerted action as alleged has been established or sustained. I therefore find that no conspiracy existed as alleged in the bill.

"I further find that the plaintiff has not exhausted his remedies by appeal within the body of which he is a member under the constitution and by-laws to which he subscribes. I find that it has not been established that such appeals would be useless. The proceedings against him were in conformity with the constitution and by-laws of the organization.

"I, therefore, find that the petitioner is not entitled to prevail in this bill."

We cannot understand why a member of a Local Union should ill-advisedly rush into a court for redress against a Local official for either a real or fancied wrong before exhausting all measures of relief afforded by the Constitution and By-Laws of the I. A. The fallacy of such actions has been demonstrated time and again, and still we hear of cases where Local Union disputes are made matters of public record with much time and money wasted by all parties concerned. We should like to give a bit of friendly advice to our readers: *Exhaust all remedies within the Constitution and By-Laws of the I. A. BEFORE bringing court action against the organization.*

• The many friends of Murry Smyth, for the past 12 years business agent of Local 183, Beaumont, Texas, will be saddened to learn of his recent death. Murry had been in failing health for many years, and when we spoke with him at the last I. A. Convention he predicted that it would be his last "get-together" with the boys many of whom he had known for well over 30 years.

• Al Kaye, former secretary of Hudson County Local 384, is seriously ill and has been in an oxygen tent for the past several weeks. His many friends in the Alliance are rooting for him to make a complete recovery.

• Another old-timer has passed on. Willie Friedman, financial secretary-treasurer of Philadelphia Local 307, died after a short illness. In his younger days,



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Willie was the "stormy petrel" of Local 307, but eventually all differences between himself and Louis Krouse, president of the Local, were ironed out and for the past 20 years harmony reigned.

• The SMPE Convention in Chicago last month wound up with a dinner-dance that brought out a record-breaking attendance. It was an occasion for the get-together of a large number of old-timers in the craft. Seated at our table were Gene Atkinson, Jim Gorman, Charlie McNeill, and Willie Campbell, representing Local 110; Glenn Kalkhoff, Milton Anacker, Frank Beggs, Milwaukee Local 164; Lloyd Mannon, San Francisco Local 162; Chauncey Greene, Minneapolis Local 219; Cecil R. Wood, Sr., Harry Hollander, and yours truly, New York Local 306. L. Kenneth Mayer, comptroller for the Manufacturers Machine and Tool Co. of Mt. Vernon, N. Y., was the only man at our table not affiliated with the I. A. However, he quickly got into the spirit that prevailed at the party and was "one of the boys."



Glenn Kalkhoff

A strong bond of friendship was cemented between Chicago Local 110 and the SMPE when business agent Atkinson informed the Society that the services of the projectionists at the Convention were donated by the Local.

25 Years Ago—May 1922

• Cincinnati Local Arrangements Committee was organized and installed at the Hotel Sinton for the purpose of helping delegates to the forthcoming 26th I. A. Convention to locate proper hotel accomodations and to assist them in any emergencies that might arise. . . . The Lord's Day Alliance of New York addressed a letter to movie czar Will Hays seeking to bar the showing of Fatty Arbuckle's pictures. . . . Lucrezia Bori, Chicago Opera star, was said to be interested in plans to organize all opera singers. . . . The efforts of Louis Mann, the well-known actor, to produce a show in New Britain with non-union help ended disastrously for the play. Needless to say, this situation was soon remedied. . . . The American and Columbia Burlesque circuits still feuding. . . . Wm. Z. Foster's "One Big Union" movement received a severe setback when it was rejected by the Railway Employes Union. . . . Officers of the International Ladies' Garment Workers repudiated radical elements in the union. . . . Anthony S. Noreiga of Local 162, San Francisco,

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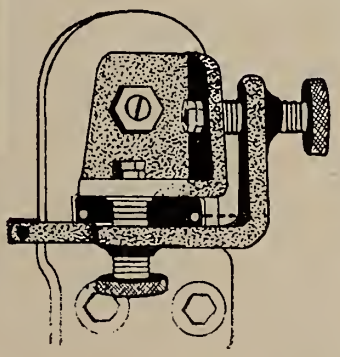
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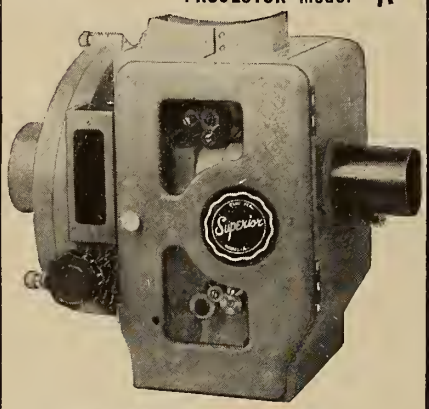
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was secretary of the 2nd District. . . . A decision of far-reaching effect was rendered by the Court of Appeals in the case of A. H. Woods vs. John F. Gildchrist, commissioner of licenses for New York City, when the court decided by a vote of four to three that the commissioner had not the power to revoke a theatre license. . . . Federal Judge Pollock of Kansas City, Kans., ruled that "men have a right to quit work when they please and the State is without power to inquire into their reasons for quitting." . . . A bill to create a Federal Coal Investigating Agency to inquire into the controversies in the coal industry was introduced by Oscar Bland, Republican representative from Indiana. . . . District Attorney Brady of San Francisco addressed a letter to the governor of California asking pardons for Tom Mooney and W. K. Billings, serving life terms for murder in connection with the San Francisco explosions in 1916. . . . Because of the forthcoming Convention, publication of the I. A. Bulletin was suspended for several weeks.

PERSONAL NOTES

H. J. BENHAM, with RCA since 1930 as a serviceman and later as service manager and sales engineer in the Cleveland district, has been named assistant to the president of Brenkert Light Projection Co. in Detroit, RCA Victor subsidiary. He will report directly to KARL BRENKERT.

• • •

C. S. HARRIS, long active in the sound products field and for several years associated with U. S. Government purchases, has been named manager of the Sound Products Section of RCA International. Also announced was the appointment of CHARLES D. CUSHMAN as manager of theatre and 16-mm equipment.

• • •

JACK O'BRIEN has been named as Sales Manager of RCA's Theatre Equipment Section, succeeding J. R. LITTLE, who is now Sales Manager of RCA Distributed Products.

O'BRIEN, with hundreds of friends in the projection field, has been with RCA since the inception of sound pictures. He played a vital part in establishing RCA's theatre dealer organization, and has held sales posts in New York, Indianapolis, St. Louis, Los Angeles, Chicago and in the New England territory.

• • •

JOHN G. WILSON, operating v. p. of RCA Victor for the past three years, has been named v. p. and general manager. With RCA Victor since 1944, WILSON was formerly with Goldblatt Bros., Chicago department store, and with Montgomery Ward & Co.

• • •

I. L. NIXON and BEN RAMAKER have been elected v.p.'s of Bausch & Lomb Optical Co. NIXON has been with B. & L. since 1907 in a sales capacity and is exceedingly well known in the film projection field.

• • •

EMIL A. KERN has been named president and general manager of J. E. Robin, Inc., motion picture equipment export house at 330 West 42nd St., N. Y. City, 18.

• • •

WALTER B. LACHICOTTE has become associated with K. Streuber, visual and sound projection specialists in both the domestic and foreign fields, at 501 Madison Ave., N. Y. City. LACHICOTTE was long associated with RCA in various engineering capacities, his most recent post having been sales manager of sound products in the RCA International Division.

• • •

Altec Inspector G. B. BROWN, a sound industry veteran, died suddenly April 30. With Erpi for many years, and an Altecman since the company's inception, BROWN has been active in the Northern Michigan area for quite a few years, where he won a host of friends.

• • •

ERNEST A. GOAD, of Sault Sainte Marie, Michigan, has joined Altec as an Inspector, headquartering at Iron Mountain, Michigan. He has an extensive background in visual and sound projection work.



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FILM PROJECTORS FOR TELE

(*Continued from page* 12)

success because of the glow retained in the incandescence of the arc crater. RCA has been experimenting in collaboration with Edgerton, using gaseous discharge lamps for this purpose for the past several years. Some degree of success has been obtained. G. E. recently announced a successful system of pulsing a low-pressure xenon lamp using radar keying technique.

RCA will adopt this pulsed-light source for the 35-mm television projector. This will make possible many projector simplifications. The problem of designing and driving a 3600-r.p.m. shutter has always been a difficult mechanical one. Without this shutter load the projector can be driven by means of the sound-head; the conventional arrangement for standard theatre projectors, using a ¼ h.p. 1800-r.p.m. synchronous motor.

Light-Pulse Checker

Design of shutters and light sources requires an accurate method of analyzing the projector light-output pulse. A phototube light-pulse checker was devised for this purpose. Some actual results are shown in Fig. 7. "*A*" represents the sharp opening and closing edges with long-duration flat top, indicating a long period of constant-intensity illumination. "*B*" shows a light pulse from a prewar television projector using a front shutter with an opening equal to the diameter of the light beam leaving the lens. The opening and closing require a relatively long time, while the maximum illumination persists for only a small time interval.

Trace "*C*" shows the light pulse which is expected when the new pulsed-light mercury lamp is used. The opening and closing edges are almost infinitely steep and the top is flat, which gives an ideal system of operation. The sharp rise-and-fall edges provide an additional margin of safety within the television blanking interval.

By using a two-trace oscilloscope it is possible to observe simultaneously the light pulse and the kinescope blanking pulse. With this technique the pulse phasing, overlap, and the lock-in characteristic between the television synchronizing generator and projector synchronizing generator and projector synchronous motor can be studied in complete detail.

A fundamental requirement of a projector is its ability to synchronize accurately with the television system. Synchronization is accomplished in that both the television synchronizing generator and the special synchronous motor on the projector have a common source of power supply. The special motor has several requirements: first, of course, it must lock in with the power-line, and second, since a standard synchronous motor has two lock-in positions, we must select the proper one.

The projector can be incorrectly phased in such a manner as to be projecting a picture on the Iconoscope during scanning time—that is, a lock-in 180 degrees out of correct phase. To eliminate this possibility of error, the motor is built with a wound rotor having polarized field-coils so that it will automatically lock-in with only one phase

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relationship. The motor used must be designed for small torque angle change with changes in load so as to avoid any tendency to "hunt," and to maintain accuracy of lock-in for any changes in load due to film loading, or changes in adjustment of the projector during operation.

Television Sound Reproduction

Film-sound for a television system will challenge the moving picture industry to maintain standards of excellence, since television uses F.M. sound transmission and the public is demanding increasingly improved standards. Sound-track reproduction from 35-mm film has a fidelity comparable with that of the best vinyl recording transcriptions. Such quality approaches the requirements for television sound broadcasting.

The 16-mm film projector equipment can produce good sound quality, useful to about 6000 cycles, but wide variations in 16-mm sound recording and processing technique make desirable a 4500-cycle cut-off characteristic. Film-sound standards must be set high-enough to enable favorable comparisons with existing radio standards of sound performance.

The 16-mm projector is shown in Fig. 8 functionally indicating the film path through the mechanism and over the sound drum to the lower take-up. The intermittent is the claw-type previously shown, with the shutter located immediately behind it.

16-mm. Tele Projector

The RCA 16-mm television film projector type TP16A is a completely self-contained unit. The projector is mounted on a cabinet-type pedestal which contains the control equipment and the motor-field supply.

The mechanism is that of the basic RCA PG201 projector, modified for television systems using a storage-type pickup tube. A 3½-inch F:2 lens is used for projection of the image. The

FIG. 11. RCA 35-mm television film projector with Brenkert picturehead with GE Syncrolite.



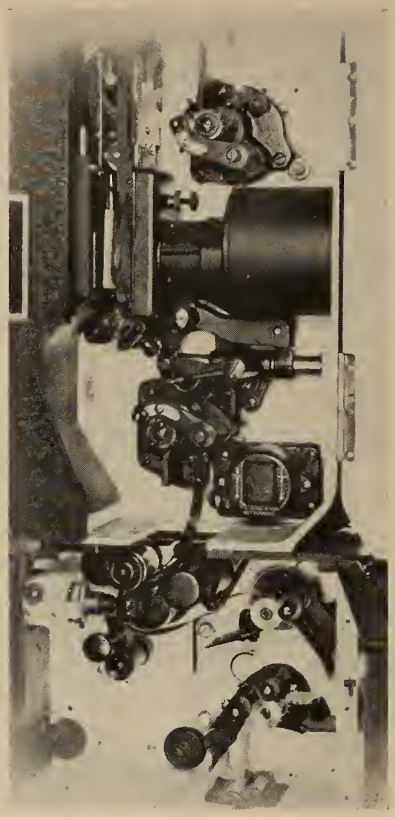


FIG. 12. Film path of 35-mm television projector.

illumination is furnished by a 1000-watt, air-blast-cooled incandescent lamp. A special synchronous motor drives the timing shutter at 3600 r.p.m. to give a pulse of 6% duration.

Assembly, Operating Details

Figure 9 shows the film side of the projector. For normal operation the two circuit-breakers are closed, which completes the circuit to the motor-field supply, the audio amplifier, and the control circuits. The stand-by switch is then closed, placing the projection lamp on warm-up voltage, supplied through dropping resistors.

The projector can now be placed in operation by closing the *run* switch, energizing the motor, and placing the lamp on full brilliance. An elapsed-time indicator is provided to record projection lamp hours.

For installation it is necessary only to connect the equipment to a source of 220-volt, 60-cycle, 3-phase power for the motor, and 115-volt, 60-cycle single phase for the projection lamp and auxiliaries. Control circuits with provision for remote operation are connected to the usual 12-volt d.c. supply voltage common to most installations.

Fig. 10 shows details of the shutter and drive gear. The small motor beneath the main drive motor operates a blower which ventilates the lamphouse. The RCA rotary stabilizer used for the sound take-off drum is shown in the foreground. A ladder chain-drive powers the lower reel takeup.

The amplifier assembly is a completely self-contained unit shock-mounted in the base casting. It consists of a three-stage audio amplifier, designed to feed sound at a 4-db level to a 250-ohm line; an oscillator-type exciter-lamp supply, and the power-supply rectifier. The base casting rests on leveling screws to provide proper projector alignment.

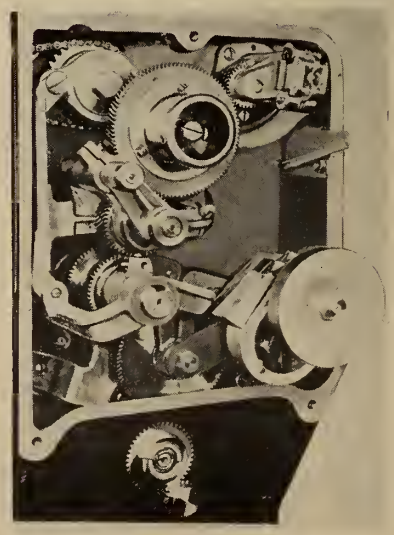
Tele Projector Data

Composite photographs have been prepared to show the new RCA 35-mm television film projector, type TP35A (Fig. 11). This projector represents the latest advance in the art of motion picture projection for television. The basic machine is the well-known Brenkert *BX* 80. The latest RCA soundhead powered with a special synchronous motor is used as a companion unit. This combination is mounted on a deluxe pedestal for rock-steady projection. The lamphouse contains the pulse light unit. complete. with all power supplies and auxiliaries.

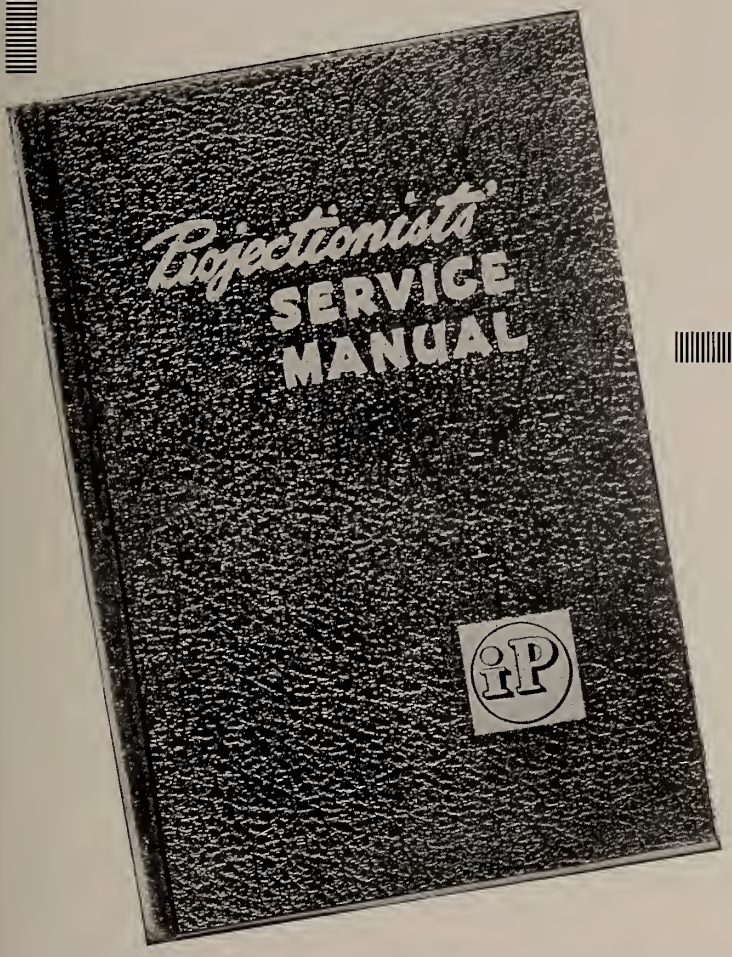
The operating side of the projector is shown in Fig. 12 to illustrate the clean and rugged design of the equipment. All bearings are automatically lubricated on the gear side of the Brenkert projector, thus keeping oil away from the film side.

Wide-mesh helical gears (Fig. 13) running in a continuous flow of oil provide a long-life, trouble-free mechanism. Oil is pumped from the reservoir in the base of the main frame to the rotary lubricator which throws the oil to all bearings and gears. The shutter governor is shown at the top, the framing adjustment through the link appears at the left, and the intermittent mechanism with its cam flywheel is shown at the lower right. A gear-case cover completes the assembly of the picture-head and provides an oil-tight gear case for the mechanism.

FIG. 13. View of 35-mm television projector mechanism.



Guessing



can be expensive

Guessing can be expensive at any time but particularly so today with the present limitations on new projection room equipment and with the uncertainties of replacements. Every projectionist should know the whys and wherefores of his equipment. He should know what to do and what not to do when the equipment fails to function properly—and how to keep the show going until the service inspector arrives at the theatre.

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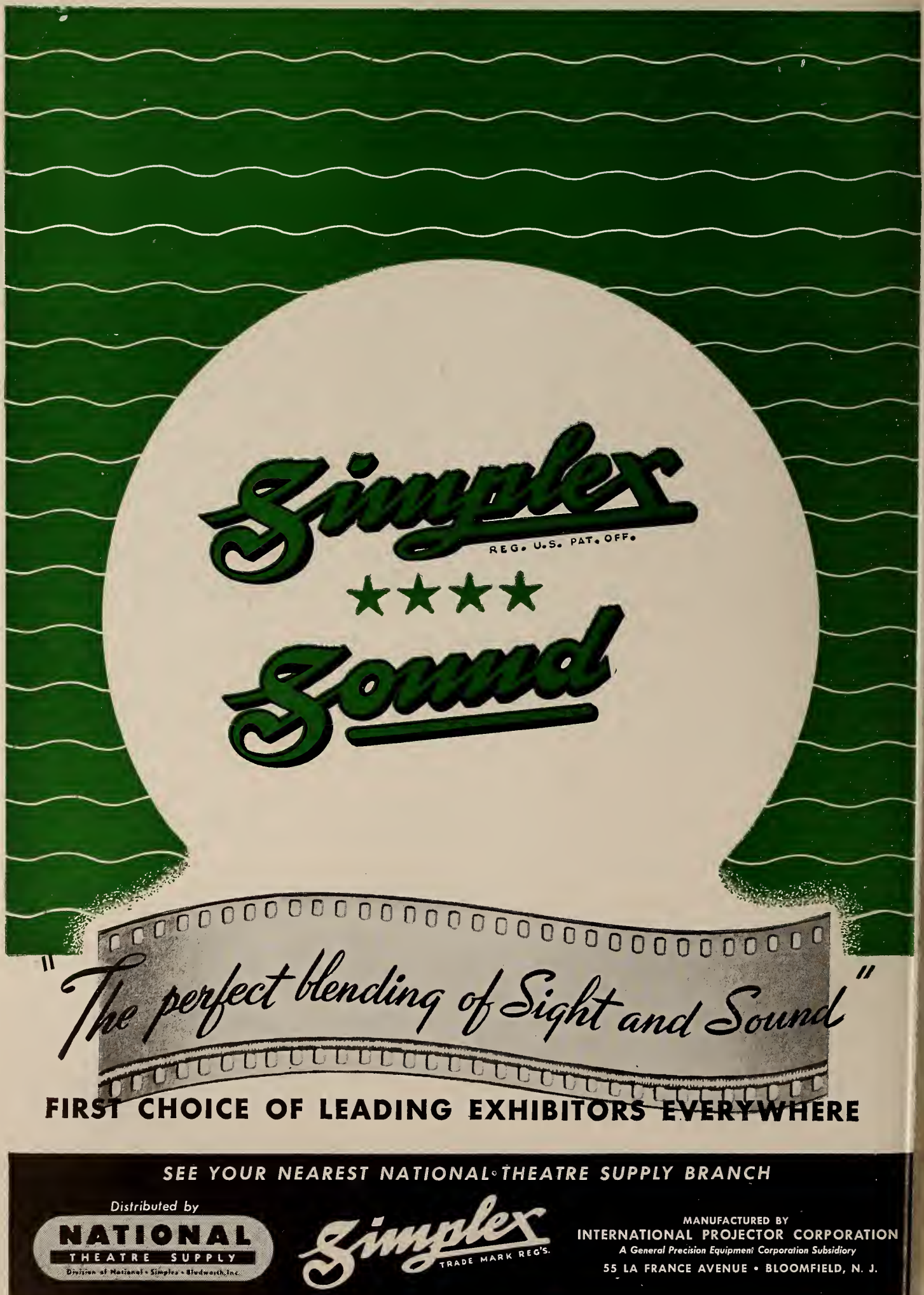
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Out of some cold figures, came a story to warm America's heart

NOT LONG AGO, the Secretary of the United States Treasury studied a figure-covered sheet of paper.

The figures revealed a steady, powerful upswing in the sale of U. S. Savings Bonds, and an equally steady decrease in Bond Redemptions.

But to the Secretary, they revealed a good deal more than that, and Mr. Snyder spoke his mind:

"If you give them the facts," he said, "you can always depend on the common sense and long-range judgment of the American people.

"The last few months have given us heart-warming proof of that.

"After the Victory Loan, sales of U. S. Savings Bonds went down—redemptions went up. And that was only natural and human.

"It was natural and human—but it was also dangerous. For suppose this trend had continued. Suppose that, in this period of reconversion, some 80 million Americans had decided not only to stop saving, but to spend the $40 billion which they had *already* put aside in Series E, F & G Savings Bonds. The picture which *that* conjures up is not a pretty one!

"But the trend did NOT continue.

"Early last fall, the magazines of this country—nearly a thousand of them, acting together—started an advertising campaign on Bonds. This, added to the continuing support of other media and advertisers, gave the American people the facts . . . told them why it was important to buy and hold U. S. Savings Bonds.

"The figures on this sheet tell how the American people responded—and mighty good reading it makes.

"Once more, it has been clearly proved that when you give Americans the facts, you can then ask them for action—and *you'll get it!*"

What do the figures show?

On Mr. Snyder's sheet were some very interesting figures.

They showed that sales of Savings Bonds went from $494 million in last September to $519 million in October and kept climbing steadily until, in January of this year, they reached a new postwar high: **In January, 1947, Americans put nearly a billion dollars in Savings Bonds. And that trend is continuing.**

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Save the easy, automatic way—with U. S. Savings Bonds

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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

TRAGEDY seldom invades these pages, which are given over in the main to inanimate things, and never such stark tragedy as that pertaining to the death of Marion Joseph Shea, 15-year-old "projectionist", whose untimely and wholly unnecessary passing was at once an ineradicable blot on the history of the motion picture business and a challenge, particularly to the projectionist craft, to utilize every resource to prevent ever again, but *never*, a repetition of such a happening.

Our story about the Shea lad (p. 18) was not set down because of any cheap sense of obligation to protect a solitary projection room job for one of our own —the need for dignity was much too pressing to permit any such approach— but rather to focus the attention and engrave upon the hearts and minds of all who read our wholly inadequate words the necessity for preventive action.

Machines used in any process, when properly designed and constructed and intelligently used, are mute, willing servants; but if there be any serious defect in the machine itself, or any severe degree of misuse, or any marked deficiency in the human being who operates it, the machine often wreaks terrible havoc upon those whom it was designed to serve. The validity of this statement is attested to in fulsome measure by our daily newspapers.

On the human side, inexperience and carelessness are the prime ministers of tragedy, and only the latter deficiency warrants even a slight measure of excuse on the basis of that frailty of which we all have more than a trace. But experience is the attribute of age only—and even the most heartless person would not attempt to sustain the stand that a 15-year-old boy has lived long enough to understand, much less attain even a moderate degree of competency, to operate the complex and potentially lethal visual and sound reproducing equipment that is utilized in the modern motion picture projection room. Experience the attribute of age only? Indeed.

But enough of this ineffectual review of known facts: words are quite useless to express adequately the mixture of sorrow and rage and futility that take possession of one's feelings when confronted with such a shocking lack of decency that not only permits but induces, actually encourages the blending of such tragedy-provoking circumstances.

To seek to forgive the unforgiveable death of the Shea youngster on the score of ignorance would represent the epitome of charity, but were it possible to do so the path of action that should lead us on is none the less clearly defined. The ignorant must be informed; the unfeeling must be sensitized, even to

(*Continued on page* 34)

As though singing to each one alone...



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INTERNATIONAL PROJECTIONIST

VOLUME XXII JUNE 1947 NUMBER 6

Acetate Stock to Supplant Nitrate

By HENRY B. SELLWOOD

ONE of the most important developments in the history of motion picture projection—the substitution of acetate film for nitrate stock—has been given great impetus by the intensive and very successful research work done during the past year, particularly in the laboratories of Eastman Kodak Company. This switch in film bases will affect importantly the economics and, possibly, the operating procedures of both the production and exhibition fields.

Present indications are that the previous estimate of from three to five years as the time required for the changeover on all release prints—both black-and-white and color—was conservative, and informed technicians now estimate that within three years at the outside the change will have been gradually effected.

In fact, only the lack of equipment prevents Eastman, to mention only one company, from embarking on an all-out acetate film production job. The laboratory job is done and all wrapped up.

Trucolor Only Present Series

At the present time only one series of prints in general release utilize the new and greatly improved acetate stock, these being the Trucolor prints distributed by Republic Pictures. Some Cinecolor and a few Magnacolor prints have been made on acetate film, but these were the exceptions to the general rule. The introduction of these acetate films, incidentally, poses a bit of a projection problem with respect to splicing, since ordinary film cement will not work with acetate film. This point is discussed subsequently in this article.

In February, 1946, the late Ed Kuykendall, then president of the Motion Picture Theatre Owners of America, called for the immediate use of acetate film for all release prints. Citing the many acetate prints used by the Armed Forces during the war years, the exhibitor leader stated that acetate stock was just as "cheap, durable and quite as efficient" as nitrate film and, further, that it would greatly reduce the fire hazard in theatre projection rooms. The use of acetate film, he added, would riddle the argument used by projectionist unions for a "full safety crew," this point apparently being the principal reason for isuing the statement.

Taking notice of widespread industry interest in the Kuykendall pronouncement, Eastman Kodak Company issued a formal statement which exposed certain existing misconceptions anent acetate stock. Asserting that while numerous prints were used during the war by all governmental agencies and "performed satisfactorily *under the conditions under which it was used*" (italics ours), there was no question but that the best acetate film was inferior in wearing quality to nitrate stock. Further, "any attempt to generally replace nitrate film with the present Safety would inevitably result in substantially increased print damage and much higher print costs to the industry".

Great Improvement in Year

On the score of cost Eastman was most emphatic that "no experience to date has indicated that Safety base can be produced as cheaply as nitrate. When and if a completely satisfactory Safety base can be made and sold in quantities comparable to the present output of nitrate, the price might be lower than the present 1.25-cent price of current Safety positive, but there is no present prospect that it could reach the low price level of nitrate film".

Thus the situation a little more than a year ago. Apparently Eastman has

Acetate Film Projection

Ordinary nitrate cement will not work with the new acetate film. Special acetate cement is necessary, although at least one all-purpose cement for both nitrate and acetate stock is available from the Roscoe Labs. All prints should be carefully checked by means of edge-markings which appear about every foot throughout each print.

effected a great improvement in acetate stock during the past year, because it is known that the only limitation on the extensive use of acetate right now is the lack of production facilities. The use of a film support chemically different from that heretofore used is now in use for Eastman 16-, 32-, and 35-mm acetate positive stock.

Several basic physical properties of this new film support are quite definitely superior to those of the previous product, resulting in higher strength, greater rigidity, greater resistance to the effects of moisture and humidity, and in higher wearing quality than was possible with the earlier material.

While this new material comes much closer to the wearing quality of nitrate than did previous types, there is no disposition on the part of Eastman to advance the idea that acetate can match the wearing quality of nitrate stock. In fact, it is readily admitted that if both films are run until broken down the nitrate base will, on the average, outwear the Safety. Just how important a factor this may prove to be will have to await a more extensive use of the acetate stock.

The big advantage of acetate film is, of course, the reduction in the fire hazard. It requires a really hot fire to ignite on a reel. There is also the problem of storing nitrate film in quantity. Not only does acetate film offer the advantage of not igniting easily, but it will not sustain the roaring fire that nitrate film will. Also, nitrate film will decompose in storage in time, while acetate film will not.

Wearing Quality Questioned

Although the present Eastman acetate base is of the same weight as nitrate base and requires no special handling, I. P. has been informed by projectionists having extensive experience with Trucolor prints that the film tends to tear rather easily, certainly more so than does the nitrate stock. No explanation as to the possible reason for this tendency to tear has been forthcoming from any film manufacturer. The general introduction of the proposed new 0.943-inch intermittent sprocket is expected to be a great aid to the projection of acetate stock, the chief problems incident to which to date having been satisfactory dimensional characteristics and ability to stand the strain of projection.

The matter of cost still is an important factor in any general use of acetate film, all film manufacturers being in agreement that it is not yet possible to get the price down to that of nitrate. Whether the advantages of acetate will compensate for this price differential will not be apparent until a great many acetate prints are in general release.

This new acetate stock has a greatly decreased range of solubility in organic solvents, thus posing a splicing problem for projectionists. Regular cements definitely will not work with this new acetate stock. Eastman evolved a special formula for this new stock, thousands of samples of which have been distributed throughout various branches of the industry. In addition, all purchasers of the film and all exchanges were notified, and the formula was supplied to all cement manufacturers.

Caution on Cement Use

Despite all these safeguards there were a few untoward incidents with Trucolor prints, several theatres in the New York area having had splices come apart during projection because the projectionists had not been advised of the necessity for using the special cement. Among the cements suitable for the new acetate stock are, to mention only two, the Rosco Laboratories (Brooklyn, N. Y.) All-Purpose Cement and the Kodak Safety Film cement.

While the Kodak Nitrate Cement will not work with the new acetate stock, the Kodak Safety Film Cement will work with *both* acetate and nitrate film, as will the Rosco All-Purpose cement. All projection rooms should have available both types of cement, suitably labelled. Extreme care should be exercised to avoid any switching of containers.

Craft Alertness Required

Despite every precaution taken by exchanges to identify the new acetate stock, projectionists will have to be on their toes and alert to spot these acetate prints. The best means for spotting these prints, of course, would be a conspicuous marking on either the reel band or the film can. Considering the normal exchange operation, however, there is little reason to expect that such procedure would or could be followed.

The only sure method to avoid any slips is for the projectionist to refer to the edge-marking which appears about every foot along the edge of the film. This marking will be either "Kodak Nitrate Film" or "Kodak Safety Film," the latter, of course, indicating the new acetate stock.

I. P. will welcome reports from projectionists having experience with this new acetate stock, particularly with reference to its wearing qualities.

Inspection Forms Only Craft Protection Against Film, Equipment Defects

REACTION from the field to the *Monthly Chat* column in I.P. for May (p. 3) was immediate and vigorous, proving that film mutilation still is a very "live" topic and also that exchange managers are no less sensitive than projectionists to criticisms of their procedures.

The aforementioned chit-chat discussed film mutilation in general, and particularly in the Dallas area, from whence had emanated reports of widespread film mutilation. The exchanges charged that holes ¼ inch in diameter were punched in the film and that silver paint and red crayon predominated among the assorted markings smeared at the ends of reels. Also, prints were slashed and generally handled in such an unprofessional manner, including packing, as to render entire reels unfit for further use.

Usual Trade Press Hokum

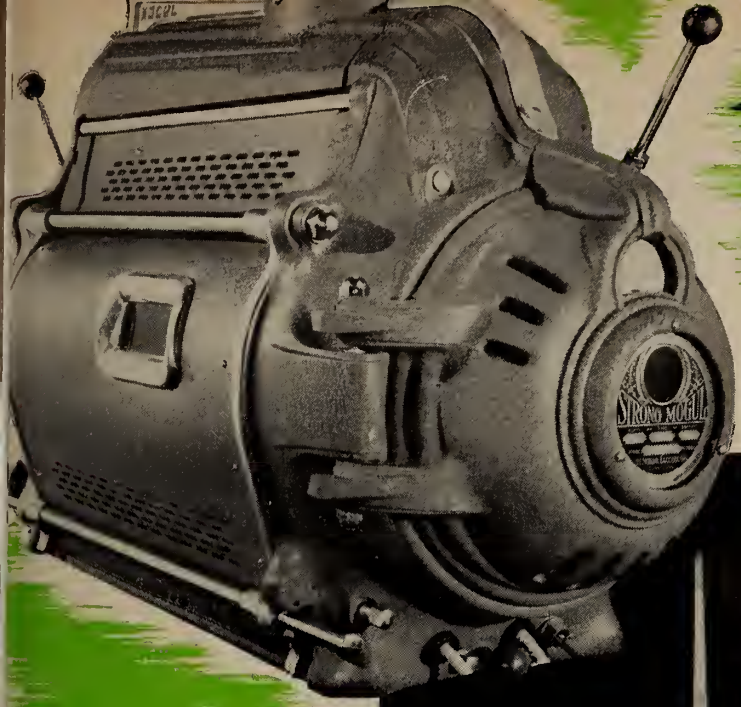
Refusal of service and billing down to the last foot of damaged film was the answer of Dallas exchange managers to this outbreak of mutilation. Needless to say, the theatres affected not only paid up promptly but also promised to be good boys in the future—the moral of which action should not be lost upon projectionists.

Although the original outcrys by the exchange managers were most specific in attributing film damage to "irresponsible projectionists," the exhibitor trade press so handled the yarn as to imply that practically *all* projectionists were delinquent. Ever alert to such shennanigans by the exhibitor press, I. P. investigated on its own—with results as anticipated.

Enlisting the aid of G. L. ("Pappy") Luther, enterprising business manager for Dallas Local 249, I. P. readily ascertained the *facts* anent the Dallas situation. Need it be said that the low-down varies considerably from trade press reports?

"Pappy" Luther contacted *all* the major film exchanges in Dallas, and also did a little checking on his own in various theatres. The exchanges, without exception, reported that all complaints registered in their inspection departments related to films that had been shown in the smaller theatres in outlying

(*Continued on page* 25)



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THE 1947 MODEL NO. 17570

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Projects 15000 LUMENS OF LIGHT



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When the lamps are **STRONG** *the picture is bright!*

THE MAXIMUM LIGHT FILM WILL ACCEPT WITHOUT DAMAGE AND AT THE LOWEST POSSIBLE COST!

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It is impractical to use more than 15,000 lumens of light as it would damage the film, and no advantage is gained by the use of contraptions for cooling the gate, or glass heat filters, for they absorb practically as much light as they do heat, in addition to being too expensive and complicated for typical theatre applications.

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Television Today and Its Problems

By DR. ALFRED N. GOLDSMITH
Consulting Engineer, Radio Corporation of America

This is a general review of present-day television by an acknowledged expert in the art who is no stranger to I. P. readers. Included in "Television" (Vol. IV), a summary by "RCA Review" of video developments from 1942-46 inclusive, this article covers studio equipment and operations, remote pickups, special studio techniques, programming, network facilities, receivers, and other development factors.

COMMERCIAL television broadcasting is now an active and growing art in America. Despite its comparative youth, it has attained much of the picture clarity, program flexibility, and entertainment capabilities of motion pictures. It surpasses even that well-developed art in its spontaneity of presentation, its occasional rendering of the unexpected, its instantaneity and immediacy of production and reproduction, and its economical production technique.

As the result of several years of careful planning and testing, studio equipment may be regarded as semi-standardized. It is able to meet all normal operating requirements to a reasonable extent. Most of its future development will be more in the direction of detailed improvement, in all likelihood, than of radical modification (unless, at some future date, basically different methods of television operation should be discovered and found superior to those now available—a somewhat unlikely contingency).

Studio and remote-pickup cameras are now highly sensitive and readily handled. The image Orthicon has proven to be a picture tube of unparalleled capabilities. Its sensitivity is a hundredfold greater than the original Iconoscope and its resolution or detail-recording power has been brought to a satisfactory level. Television cameras may in the future be made even more mobile and free from limitations on, or rapid changes of, their position. The view finders, being electronic, are non-parallactic and truly indicative of the actually transmitted pictures.

Lighting, Control Units

A full complement of lenses is available which can be used at distances of from tens to hundreds of feet from the subject, and capable of covering anything from a clear wide-angle view to a nearly flawless close-up. Practically any desired "effect," wipe, fade, or the like can now be optically or electronically secured.

At the present time television pictures lack depth of field in some cases. The problem of increasing this depth can be attacked by the use of cooler light sources and more of them, more sensitive camera tubes, or specialized optico-electrical systems of studio illumination inherently capable of delivering an increased range of field.



Dr. Alfred N. Goldsmith.

Studio lighting today is usually adequate in amount, but there is room for future improvement in its dramatic values and in the more widespread and skillful use of modelling lighting of types showing actors and sets to best advantage.

When color television is ultimately commercially achieved, additional lighting problems will arise. The color quality of illumination must be more carefully controlled. Adequate lighting for color pickup and reproduction ranges from eight to fifteen times the amount necessary for black-and-white operation, the exact figure depending in part upon design skill and in part upon the desired fidelity of color reproduction.

Special Studio Techniques

Studio control equipment during the last years has become more dependable, accurate, and convenient in manipulation. The task of the director in "editing" the television production in the control room, and as it progresses, has become more effective and less trying. Further, the control of the activities of studio personnel from the director's control desk is now more rapid and complete than it was in the past. There remains for the future the development of methods for simplifying the tasks of the camera men, the microphone-boom operators, and the actors, through coordinated assistance from the control desk.

A new era in the scope and quality of remote pickups was ushered in by the modern highly sensitive television camera. Sports events under normal lighting are now most acceptable elements of the television program. In the days to come, the portability and ease of manipulation of remote equipment will doubtless be even further enhanced.

It is necessary that connections between the cameras, the remote-pickup control equipment, and the receiver which controls the main transmitter shall be compact, light, easy to handle, and yet capable (as they are today) of transmitting the sight and sound signals without noticeable distortion.

The optical or electrical insertion of backgrounds has been under study. It appears likely to prove a useful factor in the future in readily enabling more elaborate and yet economic productions. If a length of film or a slide can adequately replace a physical set for background purposes, many studio problems and economic limitations will be worked out in the control room rather than on the studio floor.

Use of Film Transmissions

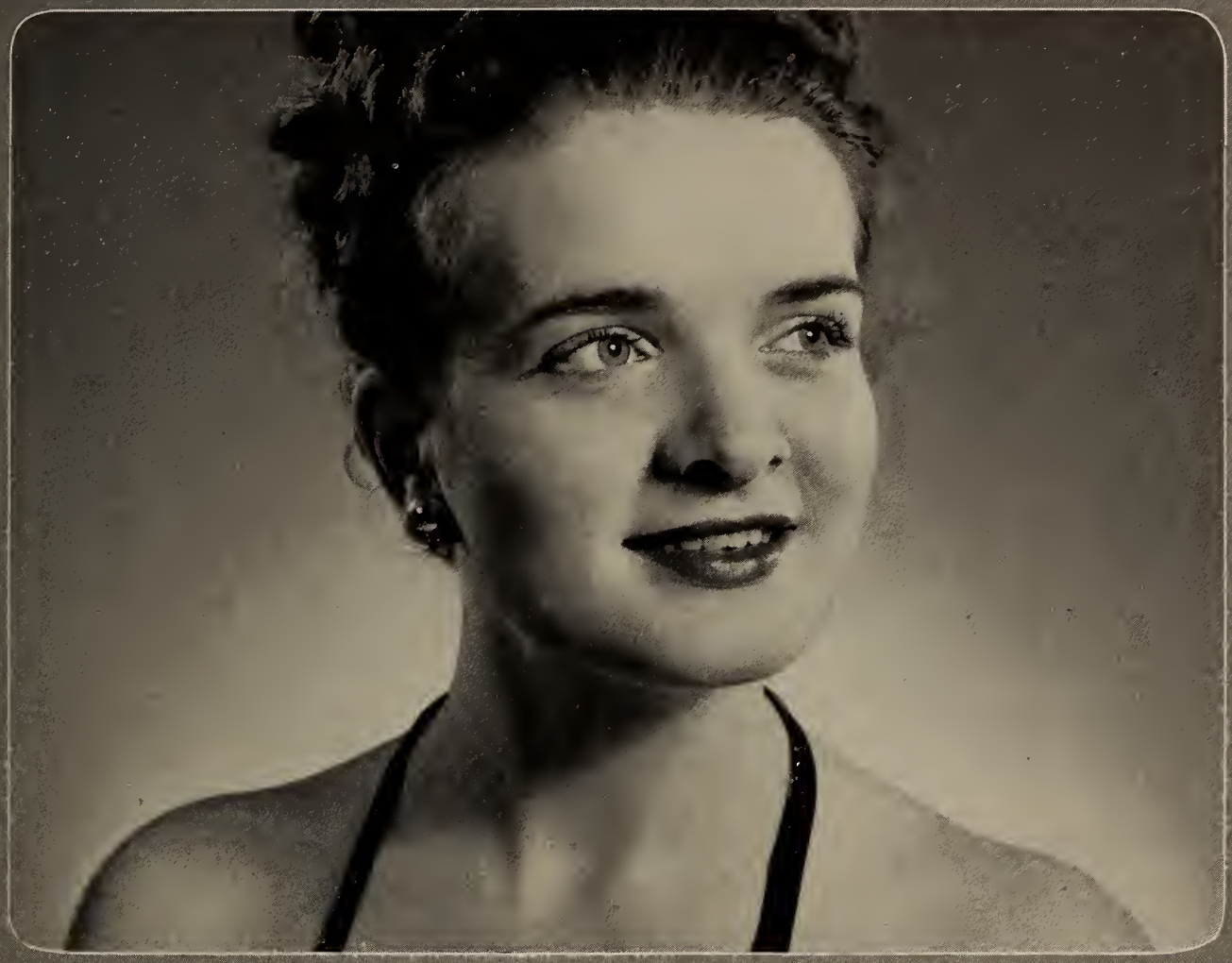
Picture presentations are increasingly elegant and smooth. Fades, dissolves, and wipes can be optically or electrically contrived. Numerous novel and attractive "effects" have been found feasible—and doubtless many more of these will be evolved in the future.

At present, live orchestras are unavailable because of restrictions imposed by their labor organizations. These restrictions have, however, benefited television in one respect. They have made necessary the development of convenient and economical ways of using orchestral and vocal phonograph records in television, employing an evolved dubbing technique.

The home audience may, for example, hear a singer in actuality, accompanied by an orchestral recording of the selection which he is singing. Or the entire sound reproduction in the home may originate on a vocal and instrumental record which is transmitted on the audio channel and which also "cues" the actor in the studio so that, so far as the audience is concerned, he seems to be singing the actual selection in exact time. These methods may be further elaborated in time, even if live orchestras become available, since they have certain inherent technical, operating, and economic advantages.

The use of film transmissions in television is considerable at present. The

(*Continued on page* 26)





He takes the words right out of her mouth...

BY his interpretive use of equipment —his skill in anticipating motion— the microphone boom man takes the words "right out of the mouth" of actor or actress . . . correlates sound with action so that clarity and proper perspective are always maintained.

Thanks to him, today's motion pictures have the freedom of action which was lost when sound was first introduced on the screen. A great part of the reality which is so essential to a picture's success depends on the boom man's skill and on his close cooperation with the sound mixer.

And equally essential to the boom man's success are superior sound films . . . films which have the quality, so uniformly found in Eastman Films, of assuring faithful reproduction.

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Polarizers and Stereoscopic Pictures

By J. A. NORLING
Loucks and Norling Studios, New York

Several inquiries from I. P. readers anent the progress being made with polarized light control and its relation to stereoscopic pictures are discussed in the appended abstract of a recent contribution to the S.M.P.E.† Journal by a pioneer worker in the art.

THE projection of three-dimensional pictures of outstanding quality has been made possible on a large scale by using polarizers. Of course, Polaroid viewers must be used to sort out the dual polarized images so that each eye receives only the image it would see in normal vision.

One method successfully used has been by dual projection. In the case of motion pictures, two interlocked machines (Fig. 1) have been used; also, films can carry pairs of images and be run in a single machine. Lantern slides have been projected in dual machines wherein each lens has its own polarizers. The polarizing axis of the left-eye polarizer slants 45 degrees to the right, and that of the right-eye polarizer 45 degrees to the left. Viewers are assembled with the right-eye polarizer crossed with that of the left eye, and *vice versa*. A metallic surfaced screen is required, preferably a sprayed aluminum one.

Polarized light projection has been used in foreign lands as well as in the U. S. In Europe they have been limited to small-screen projection of stills before small groups. So far as can be learned from the available literature, the only large screen used has been in this country, where stereo motion pictures and stills have been shown on screens up to 15 x 20 feet. It is most likely that more progress has been made in the U. S. in this application of polarizers than anywhere else.

To date, the most remarkable development in polarizing photo-materials is the Vectograph, which promises a practicable approach to the simplification and wide use of the stereoscopic process.

In this new film the image itself is a polarizing image. It polarizes the light passing through and does so in varying degrees. Fig. 2 shows a single image Vectograph picture, partially covered by a polarizer. In the region outside the polarizer the image is almost invisible.

In the picture the darkest areas are the result of almost complete polarization. Lighter areas are the result of partial polarization. In the white areas, there is virtually no polarization at all.



FIGURE 2
A single Vectograph image, showing area brought to full contrast by a Polaroid filter whose axis is set at 90 deg. to the polarization axis of the image.

Two Vectographs, each having its own picture, can be combined. The polarizing axis of one is made to slant at right angles to that of the other. By the polarizing filter the pictures can be made to appear alternately.

If a pair of stereoscopic images should be printed in this kind of Vectograph form, we have a method of producing three-dimensional pictures. In the three-dimensional Vectograph the polarizing axes of the stereoscopic images are slanted 90 degrees to each other. If the Vectograph is viewed through Polaroid viewers, the scene resolves into a natural two-eye view.

It is evident that no special projectors are required for Vectograph films, the only special requirement being the screen. Incidentally, a large percentage of this country's theaters are equipped with so-called "silver screens" which are perfectly suited to the projection of polarized light images.

Vectographs can be made as reflection prints of large size as well as small. They were widely used by America's armed forces and a rapidly growing peacetime use for commerce and industry is in progress.

A fascinating application of the stereoscopic process is in three-dimensional drawings. Many of these have been made and they are truly intriguing. John T. Rule, of Massachusetts Institute of Technology, can be credited as the pioneer in this field.

The three-dimensional animated cartoon may some day afford hilariously exciting moments for millions. For the historian who records the first of such events, I believe the birth of the three-dimensional cartoon to have been early in 1939, when Walter Ball, of our studios, animated a few short scenes for a three-dimensional movie made for an exhibitor at the New York World's Fair.

Now I should like to make a few predictions. The first is: light control through polarization will find increasing use in photography, and uses not dreamed of today will enable photographers to devise new forms of pictorial expression. Second: special lighting equipment, employing polarizers, will be developed to meet demands for new and improved lighting effects. Third: polarized light control will make possible the three-dimensional film for which the motion picture industry has been waiting. and finally: polarized light control in electronic picture reproduction will bring three-dimensional pictures to the television screen.

† J. Soc. Mot. Pict. Eng., February, 1947, p. 129.

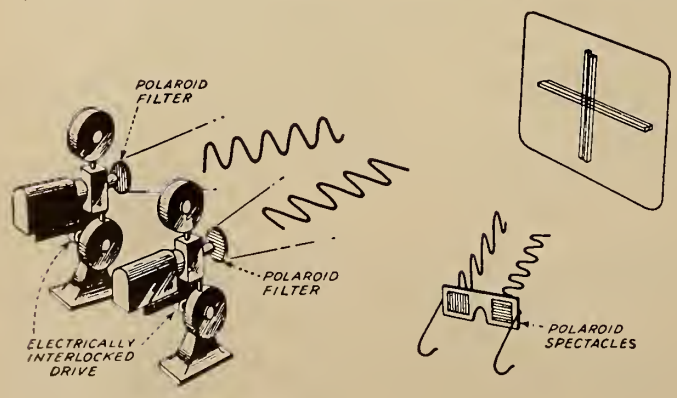


FIGURE 1
Diagram of a double projector installation using Polaroid.



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Natco Model 3019-2 Sound Projector

SIMPLIFIED operation keynotes the new NATCO Model 3019-2 professional 16-mm sound-film projector, which has many other features for projectionists. In setting up, for example, there are no reel arms to remove from the cover of either the projector or the loudspeaker case and then put on the projector before the film can be threaded through the projector. The Model 3019-2 employs only one reel arm and it is hinged onto the body of the projector. Spindle for the take-up reel is on the projector body itself.

For further convenience, both reel power supply and to the loudspeaker, all jacks are on the operating side.

Once the projector is set up, reference can be made to a large threading diagram incorporated into the casing finish on the operating side, making unnecessary an operating manual or threading diagram. Straight-line threading, only three sprocket shoes, and a film gate that opens wide at the flick of a finger all make for simple threading of the NATCO Model 3019-2.

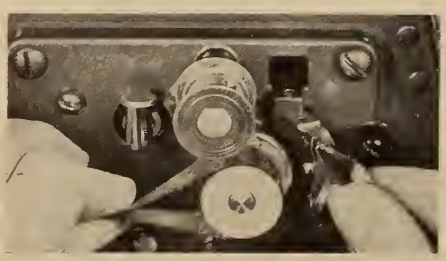
The sprocket holes are on the inner edge of the film, not on the outer edge as is conventional. The sprocket shoes



The Natco projector features centrifugal power switch that permits motor to attain operating speed before lamp is switched on. A large threading knob permits rotation of mechanism while threading. Easy-working, spring-loaded tilting mechanism raises projector automatically as soon as thumb screw is released.

spindles are so located that the film is above the level of the projector base, even when large 2,000-foot reels are used. This eliminates the need for special stands or tables that will permit one of the reels to hang over the edge of the projector support during operation. To simplify connecting the projector to the open wide and remain so. the film being *placed* not slid onto the sprocket. When the film is in place, the shoes snap shut at the touch of a finger. A large threading knob permits the rotation of the mechanism while threading without turning on the power. An indicator lamp shows when the amplifier switch is at the "on" position, there being no need for increasing the volume in order to hear the familiar warning hum.

Simple but sure sprocket shoe used on the new Natco opens wide with a flip of the finger to permit easy threading without any fumbling to match sprocket holes with sprocket teeth; then snaps shut securely just as easily.

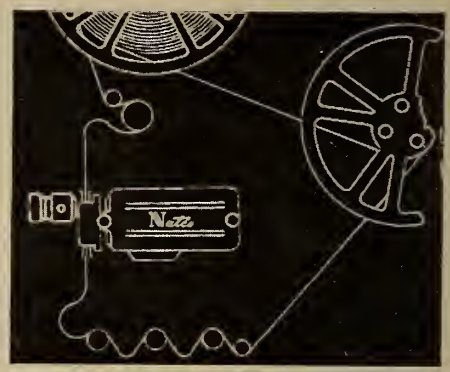


Threading, Tilting are Simplified

The usually difficult job of tilting the projector to center the picture is simplified by a patented, spring-loaded tilting device. When it is released, the projector is raised automatically by a spring to the limit of the tilt; a gentle pressure is all that is necessary to *lower* the projector. The tilt then is locked securely by tightening a large thumb screw.

All operating controls are grouped together for convenience. The amplifier volume and tone controls are at the lower left on the operating side. The volume control also serves as the amplifier switch.

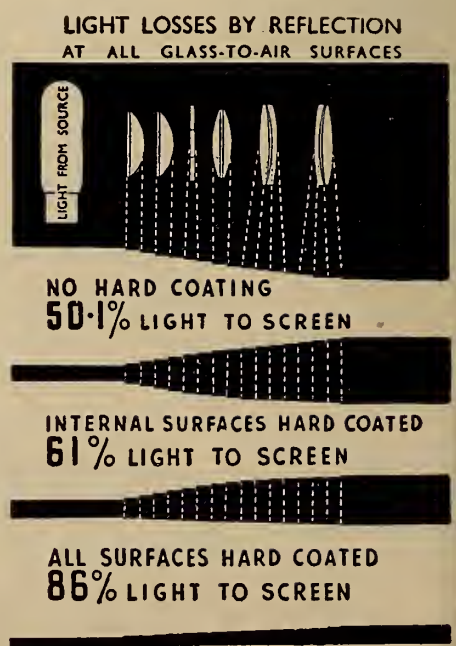
An unusual projector switch, employing centrifugal action to obtain a time lag, starts the motor and permits it to



Permanent threading diagram is a part of the actual baked-on enameloid finish on the Natco projector. It cannot rub off or become lost.

attain operating speed before the projection lamp is lighted. One need no longer fear scorching the film or disturbing the audience by flicking the light on the screen before the show starts.

A special rewind motor provides adequate power and speed for rewinding even the largest reels, and a positive rewinding switch eliminates the necessity for adjusting clutches or gadgets.



Color 'Sensation' vs. Color 'Stimulus'

FOR a proper understanding of the anatomy of color we have to distinguish between the conceptions of "color stimulus" and "color sensation," reports the *Philips Technical Review.* A color stimulus is the subject of technical color measurements. It is entirely different from color sensation, which is sometimes indicated merely by the word "color" as applying to the subjective sensation of the observer.

The fact that a given color stimulus may give rise to different color sensations is ascribed to a change in the retina of the eye under the influence of light. This phenomenon is termed "chromatic adaptation" and it greatly affects the impressions we obtain from our surroundings.

'Sensation' and 'Stimulus'

The color sensation we get from an object in our surroundings depends upon the following three groups of causes.

(*a*) The spectral composition of the light that the colored object throws upon the eye.

(*b*) The "normal" laws of additive color mixing of the eye, *i. e.*, the laws governing the results of additive mixing of colored light for the normal eye under standardized conditions.

(*c*) All sorts of incidental circumstances affecting the state of our organs of sight at the moment.

The result of a technical measurement of color is called "color stimulus," which depends only upon the factors *a* and *b* aforementioned.

The circumstances *c* affecting the color of a beam of light of given physical properties come under the following headings:

(*1*) Characteristics of the eye of the individual observer.

(*2*) Properties of the objects viewed which evoke physical influence, *i. e.*, memory.

(*3*) The state of the retina, which is affected by other light impinging upon other parts of the retina while the beam from the object is under view, or by such other light as may have just previously reached it.

It might be considered ideal to possess a complete set of specifications for predicting the nature of a color sensation from the various physical conditions. As, however, a color sensation is difficult to express in numerical terms and, moreover, depends upon so many circumstances, some of which are of a non-physical nature, such an ideal can never be fully realized.

Thanks to the simple normal laws of additive color mixing of the eye, it has been possible to draw up complete specifications for the measuring of color stimuli, so that now there are tables enabling one to calculate a color stimulus from the results of purely physical measurements, without any recourse to visual judgment.

Color Sensation Characteristics

The characteristic features of a color sensation are:

(*1*) Hue: the property of color sensation causing us to give the color a name such as red, green and blue.

(*2*) Saturation: the extent to which a color sensation differs from "white" or to which the sensation is "colored"; the property that causes us to speak of faded colors or of vivid colors.

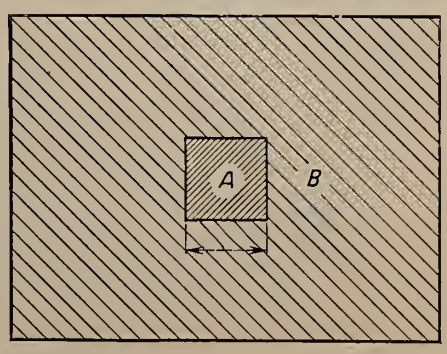
(*3*) The impression of brightness: the property that causes us to speak of light and dark colors.

The great influence of the surroundings upon colors can be further demonstrated in the following way (Fig. 1). A transparent window can be illuminated at the back with a number of differently colored lamps. Around the window is a field which may emit incandescent lamplight or artificial daylight as desired, without affecting the light passing through the window.

If the whole set-up is viewed from a few yards away and the light in the surrounding field is changed from daylight to incandescent lamplight, then in most cases after a while a decided change of color seems to take place in the small lighted window.

The fact that the change in color is not noticed until some time after the surrounding light is changed indicates that the eye requires some time to adapt itself to the changed surroundings.

Fig. 1. The chromatic adaptation of the eye is very well demonstrated by illuminating a transparent window *A* with a light of a certain color and the surrounding field, *B*, first with artificial daylight, for instance, and then with incandescent light. Shortly after changing over from daylight to lamplight the eye directed upon *A* sees a change of color in the window.



A "law" has been formulated which for a number of years now has been widely adopted by phychologists and physiologists:

"The color sensations created by the colored objects in our surroundings are practically independent of the kind of light with which the whole scene is illuminated."

RCA's Plastic Lens Advances

Highly interesting developments in the art of lens making have taken place in the Plastics Section of RCA Victor. Molded lenses used to focus enlarged images in large-screen television receivers are among the impressive accomplishments. These lenses are rated as the most accurate parts ever molded in the plastics industry.

The tolerances on the optical surfaces of these lenses are held to within ten millionths of an inch! They have an index of refraction high enough to allow them to be used in place of fine optical glass, yet they can be produced at a small fraction of the cost of glass lenses.

New Liquid-Filled Lens

Another unusual lens, molded in the Plastics Section by a "blow" molding process in which air pressure is used to create the desired shape, is a large liquid-filled lens. Placed in front of a direct-viewing television receiver, it magnifies the image 1½ times.

The Plastics Section pioneered in the application of radio-frequency current in the preheating of plastic materials. Preheating drives out moisture and gases which might otherwise cause blisters in finished parts, and brings the temperature of the material up close to that of the mold, thus reducing the curing time as well as the molding pressure required. R-f preheating insures that materials are heated uniformly and greatly speeds up the process.

Trivision Lens Development Work

First Trivision lens for three-dimensional photography has been delivered to the Navy by the Bausch & Lomb Co. The inventor of the revolutionary Trivision process, Douglas F. Winnek, will continue his work in conjunction with the Navy.

The lens, a 14½-inch, F: 2.2 coated portrait-type, is 8 inches in diameter and outwardly resembles a locomotive headlight. Width is a highly important factor, for the wider the lens the greater the degree of depth perception. Action of the lens is supplemented by standard film embossed with minute ridges, or lenticulations, on the side of the emulsion.

Astonishing Perception of Depth

The resultant photographs give an astonishing perception of depth without resort to the use of stereoscopic spectacles (analyzers). It is actually possible to see around and beyond images in the picture as the observer shifts his angle of view.

The possibilities of the Trivision process are almost unlimited. Not only in portraiture, but in aerial reconnoissance, motion pictures, X-ray and clinical work, the effects will be of great value. A photo-engraving process for three-dimensional reproduction in magazines and newspapers has also been developed, and the inventor said additional work is under way to adapt it to lithographs for use on billboards.

Kollmorgen Lens Fittinas Chart

PROJECTOR		SUPER-SNAPLITE & SNAPLITE II		SNAPLITE I
Make	Model	Fittings	Notes	Fittings
Blue Seal Cine	Superior A & U	AX-196 *AX-170		AX-151, AX-153 AX-196
Brenkert	BX-80	AX-196 *AX-170		AX-151, AX-153 AX-196, AX-170*
Century	C, CC, K Super	AX-196 AX-166	If twa clamp rings are used, so indicate.	AX-151, AX-153, AX-196
Century	K (ar Kaplan)	None		AX-153
Century	K with C-62 modification	AX-155		AX-156
DeVry	G-I	Nane		AX-153
Gardiner	Standard	None		AX-153
Halmes	Type 8, Educator	Nane		AX-158
Holmes	Type D	AX-157 AX-196		AX-158
International Prajectar Corp.	Simplex E-7	AX-196 *AX-170		AX-151, AX-153 AX-196
International Projector Corp.	Simplex, Regular	None†		AX-152
International Projector Corp.	Simplex, with C-62 modification	AX-155		AX-156
International Prajector Corp.	Simplex Internatianal	None	Will take lenses 4″ E.F. and longer only	AX-153
International Projector Corp.	Simplex Semi-professional	AX-196 *AX-170	Will take lenses 4″ E.F. and longer only	AX-151, AX-153 AX-196
International Projector Carp.	Super Simplex	AX-196 *AX-170		AX-151, AX-153 AX-196
Motiograph	AA	AX-196		AX-151, AX-153
Motiograph	F	None		AX-153
Motiogroph	F & H	None		AX-153
Motiograph	HU, HK, K Deluxe	AX-155		AX-156
Powers		AX-196 AX-157	Will take lenses 5″ E.F. and longer only	AX-158
Powers	With heavy duty focusing frant	AX-196	Will take lenses 5″ E.F. and longer only	AX-151, AX-153 AX-196
Wenzel	Pra-4, Pra-6	None†		AX-152
Wenzel	Pra-4 with large lens mount	AX-155		AX-156

*Not regularly furnished, but can be supplied if desired.
† Two .0065″ shims furnished when this projector is specified.

NOTE: When ordering lens fittings, specify:

1. Fitting numbers (table)
2. Make of projector
3. Model of projector
4. Focal length of lens

THERE is much more to the intelligent handling of orders for projection optics than meets the eye. For example, when ordering lens fittings there is an urgent need for specifying the make and model of projector and the focal length of the lens, in addition, of course, to the actual fitting number whenever possible (see accompanying table).

All this information is contained in a series of highly informative bulletins now made available by the Kollmorgen Optical Corp., 2 Franklin Ave., Brooklyn, 11, N. Y. These bulletins present detailed data relative to Snaplite lenses, Series I and II of which are covered in one folder, while a six-page brochure is devoted to the new Super-Snaplite lens which achieves the fastest speed of any known 35-mm projection lens—F: 1.9.

The Super-Snaplite is a six-element, coated lens which is hermetically sealed and has an anodized finish. It is available in focal lengths ranging from 2 to 5 inches in ¼-inch steps, the F: 1.9 speed being maintained in all focal lengths from 2 through 4½ inches. Fittings to adapt this lens to all currently manufactured professional projectors are available.

Various charts and tables supplement other useful lens data and make these bulletins a worthy addition to any ready reference file. Copies may be obtained upon request to Kollmorgen, with preference being extended to requests from projectionists.

Tremendous Film Export Rise

Export of American motion picture equipment during the first quarter of 1947 increased by a tremendous 166 per cent over the same period last year, Nathan D. Golden, Dept. of Commerce, reports. Exports of equipment reached $3,357,792, compared to $1,260,088 for the first quarter of 1946. During the same period, exports of all types of motion picture films totalled 207 million linear feet valued at $3,844,368—a dollar jump of about 55 per cent.

During the first quarter of 1947, 3,408 motion picture cameras of all types were exported, having a value of $351,941. Of this total, 128 were 35-mm cameras valued at $130,598; 1,194 were 16-mm cameras worth $138,312; and 2,086 were 8-mm cameras with a valuation of $83,031.

A total of 7,863 motion picture projectors of all types were exported during the first quarter of 1947, valued at $1,448,937. Value of motion picture sound equipment exports totalled $1,304,633 in the first quarter of 1947, of which $949,300 were sound reproducing equipment and $355,333 was sound recording equipment.

Streuber's Inclusive Export Service

The export firm of K. Streuber, 501 Madison Ave., N. Y. City 22, now offers its customers a complete engineering consultant and buying service specializing in electric, electronic and moving picture equipment. The three key men in the organization have a total of 50 years of experience in these fields.

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"THERE'S A BRANCH NEAR YOU"

AT YOUR SERVICE

This department is devoted to the man behind the man behind the gun—the serviceman. Its prime purpose is to promote a closer relationship between projectionist and serviceman based on a better understanding of their mutual problems through an exchange of news and views, kinks and kicks. Contributions from both groups are invited.

High Gain, Hum in 91-B Amplifier

High gain and hum in a 91-B amplifier was found to be caused by defective components in the feedback circuit, Resistor R17, with a normal value of 70,000 ohms, measured 130,000 ohms; and C3 2-mfd. section had low leakage resistance. Apparently the high leakage current through C3 caused failure of R17.

Replacing C3 and R17 brought the gain and hum within limits. We suggest that C3 be checked whenever either R17 or R29 fail.—H. J. Nelson, *ALTEC.*

Slow-Starting Soundheads

It seems to be the rule with a certain popular type of soundhead for the drum to come up to speed very slowly. I have timed them on 1000-cycle film and found that in some cases it requires as much as 14 seconds for the tone to clear up. The trouble is due to insufficient pressure on the lateral pressure roller on the drum.

By slipping a small thin nut under the spring at the joint in the pressure arm, thereby increasing the pressure of the roller on the drum, the drum will come up to speed well within the required time.—E. Pothier, *RCA.*

Neon Replaces S6 Filament Lamp

Much longer life can be expected from the G. E. neon pilot light: 11SV, NE 45, ¼ watt, T 4½ clear glow, than from the generally used S6 filament type lamp.—W. S. Welshonce, *ALTEC.*

Flutter at Beginning of Reel on Simplex SH-1000's

Sometimes the scanners fail to come up to speed in the alloted time, more frequently with thin film stock. There are two correctives for this trouble:

1. Use standard stock for leader.
2. Remove the SH-188 spring and stretch it so that the guide roller assembly will press harder on the scanner drum.—J. North, *ALTEC.*

Emergency Repair of KS-7871 Lens

KS-7871 lens tubes were out of focus. The lens on one machine was reset with the 8000-cycle film; but on the other it was not possible to effect a satisfactory focus. The lens appeared cloudy, but closer inspection revealed that the front lens was split in half and the back surface had separated from the portion swaged in the lens barrel.

Since this installation was a day or more away from emergency stock, transportation uncertain, and sound very poor, it was decided that no additional harm could be done, so the lens tube was disassembled, all oil cleaned from glasses, the fractured piece removed and carefully placed in position with tweezers using glycerine as a glue. The rest of the contraption was replaced and the whole unit replaced in the 211.

The lens came in perfect focus. No more splatter of light visible. Quality of reproduction was exactly the same on both machines. Deduction is that surface tension of glycerine is so high, transmission of light so good, that the light spot was no longer disturbed. Disassembly of lenses in the field is not an ordinary thing, but necessity dictates the move.—B. A. Susan, *ALTEC.*

Elimination of Clicking Noises Picked Up by Amplifying Systems

In a recent installation of a popular type sound system clicks in the output were present whenever any switching device was operated in the projection room. The pick-up of such noises was eliminated by the installation of a Cornell-Dubilier "Quiet Tone Interference Filter," rated at 5 amperes, in the a. c. line supplying the amplifiers, and through by-passing contacts of the film changeover switches with .01-mfd. capacitors.

This filter consists of an air-core choke coil, 32 turns of No. 12 wire on a ½-inch core, and two .01-mfd. capacitors: one capacitor connected from the input of the choke coil to ground, the other connected from the output of the choke coil to ground.

In one particular installation in a country mansion, the a.c. line was brought into the house as a 3-wire, 3-phase, 220-volt system, the 110-volt connection being obtained by connecting between the high side of any phase and ground. The filter choke was connected in the "hot" leg of the 110-volt circuit at the amplifier.

The housing and choke coil of this filter was originally part of a JX-51 filter manufactured by Sprague Electric Co. and consisted of the housing, choke coil and two 1.5-mfd. capacitors. The latter were removed from the housing and replaced by the .01-mfd. capacitors previously mentioned. The JX-51 filter cost 39 cents and when reassembled presented a professional-appearing job.—J. H. McGinley, *RCA.*

Electric Reel Timer

Figure 2 illustrates an electric reel timer which is at once very simple and accurate. After the first show of any run, one can time a program right down

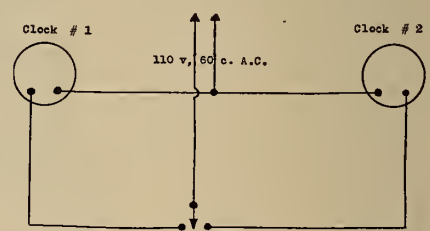


FIG. 2. SPDT switch which is synchronized with sound changeover. Clocks are 60-cycle, self-starting.

to a fine point. Intriguing for those enterprising I. P. fellows. Full credit should be accorded Wayne H. Longmire, projectionist at the Virginia Theatre, Parkersburgh, W. Va.—C. R. Shepard, *RCA.*

Noisy Faders or Volume Controls

Noisy faders or volume controls may be corrected and prevented by working some 3-In-1 oil into the bushing of the shaft, a drop at a time, and then working the control shaft back and forth. Even though the control shaft is bonded on the end to ground, it will get noisy.

Most fellows think that the noise originates in the contacts, but my experience is that nine times out of ten it will be a dirty, tight, gummy shaft that causes the trouble. A small can of light oil is a *must* in my tool kit. It doesn't make any difference what type of control it is, this light oil will help out on all of them.—J. O. Stocton, *RCA.*

'De-magging' That Fast Timepiece

With p. m. units, magnetized watches keep most of us ahead of time. Any small field coil such as the arc motor field coil used in series with a 60- to 100-watt lamp on a 110-volt a. c. circuit makes a nice gadget with which to "de-mag". Pass your watch back and forth in front of one end of the coil several times.—R. H. Hecht, *RCA.*

Complete Projection Data Charts

By ROBERT ALLEN MITCHELL

III

HEREWITH the third in a series of articles in which are provided data forms for the convenience of the projectionist in recording information pertinent to his equipment. When filled out to a reasonable degree of completeness, these forms furnish a comprehensive and accurate description of an individual installation.

This particular form (No. 3) is devoted to information relative to projector heads and magazines. No difficulty should be experienced in determining the data required. Fill out the form in pencil *not* in ink, as changes may be desirable later. Enter the most obvious and easily determined facts first, then the details.

FORM 3: MECHANISM AND ACCESSORIES DATA

Theatre _____
City _____
State _____
Theatre Circuit _____

Date _____
Revised _____

_____
Chief Projectionist

1. HEADS

Number of projectors _____

Heads, including spares _____

Make & Model _____

Serial Nos.:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Spare _____

2. HEAD PARTS

Make & type intermittents:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Spare _____

Make & type shutters:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Spare _____

Type framing-lamp bulbs:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Spare _____

Type of lens adapters _____

Make & E. F. of lenses _____

"Off-make" parts in use:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Spare _____

Are soundheads incorporated in projection heads? _____

Remarks _____

3. MAGAZINES

Make & type upper magazines:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____

Reel-end alarms or footage indicators, make & type:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____

Make & type lower magazines:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____

Will projectors take-up on small 1¾-inch hub shipping reels? _____

Remarks _____

4. CHANGEOVER DEVICES

Make & type changeovers _____

Serial Nos. _____

How operated (Give specifications of switches) _____

Are sound faders synchronized with the changeovers? _____

Specifications of automatic changeovers _____

Remarks _____

Daytime Industrials in Night Houses Offer Employment Possibilities

Vogue Theatre, popular San Francisco single-feature house for night shows only, is soliciting 16- and 35-mm industrial showings from 8 a. m. to 5 p. m. Citing the makeshift equipment and uninviting surroundings afforded such showings in the past, Vogue management believes that theatre atmosphere, seating and projection equipment will enhance industrial showings. Thus the Vogue may launch a vogue for daytime use of theatres now operating only at night. Projectionist unions please note, since idea is O. K. for any town.

New B. & L. 2x2 Slide Projector

Actual tests of new Bausch & Lomb 2 x 2 inch slide projector, using a 150-watt lamp, reveal a light increase of from 26% to 120% in foot-candles on the screen against other such units, including some models using higher wattage light sources. At the same time slide temperature is kept within safe limits for all normal projection.

Projection system consists of a 5-inch focus F:3.8 triplet lens, a 3-lens condensing system, and a ground and polished, back-silvered glass reflector. Condensing system is so computed that it completely fills both the film and projection lens apertures. Lens nearest the lamp is of special heat-absorbing glass which, with the metal chimney and lamphouse louvres, provide ample protection from heat.

IN THE SPOTLIGHT



By *HARRY SHERMAN*

MARION JOSEPH SHEA is dead at the age of 15 years, that much is certain. That which is by no means certain is whether the combination of circumstances, compounded of human senselessness and cupidity, which occasioned this tragedy will serve to prevent a repetition in kind. Also open to serious question is the proper administration, by both Federal and State agencies, of existing laws specifically designed to protect children from unscrupulous employers.

Of paramount importance, also, is the question whether all projectionist groups should not proceed immediately to spur the passage of legislation which would clearly define the projection of motion picture film as a hazardous occupation from which all minors would be barred.

The available facts in the death of Master Shea are few and quite simple, following the familiar pattern of all such occurrences—simple, that is, until death struck this youngster down, swiftly and horribly.

The Shea boy was the "projectionist" in the Town Hall, Baldwin, Louisiana. On September 2, 1946, this youngster was pursuing his "duties" during a regular film showing when suddenly a reel of film, *not* in the projector but in an open can on a shelf, "exploded".

Not a Single Burn on Body

There were no witnesses to what transpired in the projection room, since Master Shea was alone (naturally), and patrons in the theatre were unaware of what happened until the reel of film in the projector ran out. Young Shea was unable to give any evidence, continues the official report, as he "was in a comatose state from the time of the explosion until the next day, when he died." Vitally significant is the fact that there was not a single burn on the boy's body or on his face save that of singed hair, and death was officially ascribed to "suffocation". Obviously, there need be no film "fire" to cause projection room tragedies.

Ironically, the report included the statement that "it will never be determined as to how the reel of film on the shelf became ignited, as the boy did not smoke, and, anyway, *smoking was prohibited in the projection room*" (italics ours). Such concern for "regulations"!

Thus the ascertainable facts. But the story is not done—not yet. Promptly upon hearing of this tragedy last September, I. P., sensing the futility of appealing to Louisiana authorities, instigated (that's just the word) an investigation by the U. S. Department of Labor, Division of Labor Standards. It was not until April 22 of this year (seven months later!) that the results of the investigation were forthcoming.

But I. P. still was not satisfied, it being obvious that the management of the Town Hall, Baldwin, La., was guilty of a flagrant violation of the U. S. Fair Labor Standards Act no less than of various Louisiana statutes relating to the employment of minors in hazardous occupations and also on the score of excess working hours, *in any type of job*, on days when school is in session. I. P. inquired if any action had been taken to impose the penalties provided for violation of the law.

Death vs. 'Future Compliance'

The reply received from the Department of Labor surpasses the credence of any rational person. First, it was stated that the case had been handled in accordance with "established precedure for *first violations*" (italics ours). This procedure provides for notification of violations found and a "request for assurances in writing of future compliance***". Yes, such assurance had been received.

Of course, the Town Hall was in violation of Regulation No. 3 of Section 3 (*l*) of the Fair Labor Standards Act, but "future compliance seems assured in the light of this tragic accident". Moreover, the Department had no information as to whether any film was actually "repaired or otherwise processed," and, anyway, proof beyond a reasonable doubt that a person has "wilfully" violated the provisions of the Act must be forthcoming.

This is the answer I. P. received after months of unrelenting effort to spur this investigation on its torturous way, months punctuated by the receipt of many Government communications replete with the gibberish that reflects interminable red tape, months of work following a senseless and wholly preventable tragedy that terminate on the dismal note of a "promise of future compliance".

What price for your horrible death, Marion Joseph Shea, aged 15?

A Red Memo for 'Red'

Proving that the world needs not so much to be told as to be reminded is a recent item and photo in an exhibitor paper which relates how Mr. and Mrs. Z. H. Tuttle, who own the Toez Theatre in Brooklet, Ga., are using their own son, a kid called "Red," to operate the motion picture projectors. "Red" appears from his photo to be no more than 12 years old, which undoubtedly accounts for the "pride" with which his parents view his accomplishments on the job.

These doting parents will receive a tear sheet of this page with the adjoining story of Marion Joseph Shea outlined in red—for "Red".

● Morris Kravitz, business agent for New York Local 306, who was on sick leave for quite some time, has resumed his official duties and is hitting on all six cylinders again. Steve D'Inzillo, who pinch-hit for Kravitz, has gone back to his old job as projectionist at the Brooklyn Paramount Theatre.

● The Grand Lodge of the Theatrical Mutual Association (TMA) will hold its annual convention at the Regis Hotel, Omaha, Neb., July 14-16. A record turnout of members from all over the country is expected to attend the conference, and special plans are being made for the entertainment of the delegates and other visitors.

The TMA is the oldest organization of mechanical workers in the amusement field, and its membership rolls carry the

names of I. A. men from all parts of the U. S. and Canada. Philip Hitter, member of New York Local 306, is president of the Grand Lodge, and Frank Galluzzo, vice-president of Chicago Local 110, is the Grand Lodge secretary-treasurer.

● I. A. President Walsh, accompanied by Tom O'Brien, General Secretary of the British NATKE, sailed for England on June 11 for first-hand observation of how the British counterpart of our own I. A. functions. It is expected that Walsh will remain abroad for several weeks and that his visit overseas will result in a better understanding and closer working relationship between the two great theatrical organizations.

● Recent out-of-town visitors to the offices of I. P. were Bert Ryde, business representative for Buffalo Local 233, and William Hunger, former executive board member of Hollywood Local 165. Both Ryde and Hunger were accompanied by their wives and made their visit to New York a combination business and pleasure trip.

● We should like to hear from readers from those cities or states having laws calling for enclosed rewinds in projection rooms. Copies of these regulations would be very much appreciated.

● Within three hours after receiving the "go ahead" signal from the International Office, George Schaffer, business agent for Los Angeles Local 150, had signed contracts in his possession from the leading supply houses in Local 150's jurisdiction. These houses — National Theatre Supply Co., B. F. Shearer Co., Breck Photoplay Supply Co., and Projection Equipment and Maintenance Co. —have agreed to employ only Local 150 men for the installation, maintenance and repair of all projection equipment.

The contracts call for a 40-hour week, Monday to Friday, at $125 per week, per man; time and one-half pay for overtime, plus paid holidays. Minimum call of four hours for emergency calls on Saturdays and Sundays, and double-time pay for holidays. One year's service with any of the aforementioned companies entitles each projectionist to a two-weeks vacation with pay. For the use of his automobile in connection with his job, each man will be allowed 6c per mile traveling to and from his assignments, plus other expenses incurred in connection with his work.

● Patches on color film, particularly the new acetate stock, (see article on page 5 of this issue) will not hold unless you use the proper film cement, regardless of how well you may scrape both sides of the film. There are several such cements on the market—you might tell your boss to get a supply when booking color films.

● At an age when most men are sitting back and contemplating with pride their offspring, Fred Shoup, business agent for Local 193, Bloomington, Ind., is busily engaged in building his family. In 1944, at the age of 52, Fred became the father of twins, Terry Lee and Larry Gee; and on March 11 of this year Fred was presented with another set of twins, Roger Jay and Judy Lynn. We doff our topper to this intrepid exponent of bigger and better families. Congrats, Fred, and good luck to the Shoup dynasty.

● We take our hat off to Wm. P. Covert, business agent for Toronto Local 173 and second vice-president of the I. A., for the really swell job he has done in cleaning up the "rump" unions that infested various parts of Canada for many years. With the exception of Montreal, where a dual organization still exists, the entire Dominion of Canada, from Halifax to Vancouver, is now practically 100% I. A. organized.



Wm. P. Covert

Covert has devoted a great deal of his time during the past 26 months to fighting these "rumps", and has successfully eliminated them in Regina, Winnipeg, Edmonton, Saskatoon, and Moose Jaw. In Winnipeg, for instance, more than one-half of its 50 theatres were non-I. A.; but today all Winnipeg theatres are manned by I. A. members. The same holds true of Edmonton, Saskatoon, Moose-Jaw and other cities where the "rumps" flourished for a while.

We may well be proud of our Canadian brothers—they sure have plenty on the ball.

● Charles S. Bullock, president of Cleveland Local 160 since 1936, died May 25 after a lingering illness. He was one of the most widely known I. A. men, having attended all I. A., Eighth District, and Ohio State Conventions for the past 20 years. His cheerful smile, friendly handshake, and spirit of good fellowship won him scores of friends in and out of the Alliance.

Charlie Bullock came to Cleveland from New Jersey in 1912, becoming a member of Local 160 one year later. He soon took an active part in the affairs of the Local, and in 1919 was elected vice-president and member of the executive board. In 1920 he was elected chairman of the executive board, holding that office for 27 years until the time of his death.

For the past 28 years Charlie had been employed by Loew's, Inc., working in several of that circuit's houses. His last position was with Loew's State Theatre, where he worked as projectionist from 1928 to 1946, when he retired because of failing health. His father, the late Sam Bullock, a pioneer

(*Continued on page* 30)

Film Company Earnings Reduced to Simple Arithmetic

EXTREMELY revelatory is the accompanying table of comparative corporate earnings as compiled by the U. S. Dept. of Commerce and printed in the *Congressional Record* for April 7 last. These cold figures show that the amusement business *increased* its earnings within *one year* by 90.1%, or almost 60 millions in dollars, and registered a 22.4% *return on its net worth* during 1946. Of course, in 1945 they earned only 12.6% of their net worth. A total of 35% return on net worth in two years constitutes the most effective answer to those who moan publicly that the film companies cannot afford further wage increases. Salaries for executives (?) stars, directors, writers, and hordes of beneficiaries of unparalleled nepotism? That's different, bub.

Number of companies	Industrial groups	Net income after taxes		Percent change [1]	Percent return on net worth	
		1945	1946		1945	1946
15	Amusements	$64,473,000	$122,582,000	+90.1	12.6	22.4
39	Restaurant and hotel	9,953,000	13,784,000	+38.5	11.0	15.4
25	Other business services	14,176,000	17,250,000	+21.7	12.0	13.9
16	Construction	4,101,000	6,733,000	+64.2	6.3	10.0
95	Total service and construction	92,703,000	160,349,000	+73.0	11.8	19.4
241	Commercial banks	363,562,000	375,692,000	+3.3	8.9	8.5
77	Fire and casualty insurance	89,854,000	24,263,000	−73.0	6.8	1.6
144	Investment companies	128,172,000	149,407,000	+16.6	6.1	6.0
55	Sales finance companies	31,158,000	28,028,000	−10.0	6.2	5.5
88	Real estate companies	6,432,000	11,070,000	+72.1	5.4	9.0
605	Total finance	619,178,000	588,460,000	−5.0	7.6	6.5
2,958	Grand total	5,240,761,000	6,700,737,000	+27.9	7.7	9.5

[1] Increases or decreases over 100% not computed.



At the Washington end of the first long - distance television conversation.

The 20th Anniversary of Television†

By HERBERT E. IVES

Research Consultant, Bell Telephone Laboratories

"THIS afternoon at about three o'clock, connection was made by wire to Washington and the small disc connected. A perfect image was received. Kingsbury. Knapp and Ethridge were seen exceedingly satisfactorily—The first viewing of human beings at a distance of hundreds of miles was completely successful."

This entry, which I find in my log book under the date of March 26, 1927, marks the attainment of the first goal of television research in Bell Telephone Laboratories. The trial referred to took place over circuits set up between Washington and New York on which television over long distances was to be publicly demonstrated eleven days later. It was the culmination of work carried on over several years, and although the end of that particular project, it marked only the beginning of the studies and development that have now led to television networks spanning the entire country.

In January, 1925, development work had been completed on the system of sending pictures over telephone lines that was to be used in March of that year for the transmission of pictures of the Coolidge inauguration from Washington to New York, Chicago and San Francisco, and soon thereafter to be in commercial service. Today it is in world-wide use by news associations.

'True' Video Essayed in 1925

It was agreed that we should undertake, as our next problem, to speed up the picture system to the point where the product would be "television"—that is, the production and transmission of a picture in 1/15th second, instead of in seven minutes. On January 23, 1925, I prepared a memorandum surveying the problem and proposing a program of research.

The survey discussed the characteristic difficulties of securing the requisite sensitiveness of pick-up apparatus; the wide-frequency bandwidths which from our experience with picture transmission were indicated as necessary for television; the problem of producing enough modulated light in the received image to make it satisfactorily visible; and the problem of synchronizing apparatus at separated sending and receiving ends. It concluded with the proposal of a very modest attack, capable, however, of material expansion as new developments and inventions materialized.

The apparatus proposed for immediate construction comprised two Nipkow discs mounted at the ends of a single axle, each with a spiral of 50 pin holes. This number was chosen as appropriate to the rendering of the face and shoulders of the subject and on the calculation that the frequency band required for a 15-per-second scanning—about ten times that for voice transmission—could be reached on available transmission channels.

A photographic transparency, later to be superseded by motion picture film, was to be used at the sending end, and to secure enough light for the photoelectric cell, it was proposed to focus the crater of a carbon arc lamp on the cell by a lens at the disc plane. At the receiving disc, a crater gaseous glow lamp, modulated by the amplified photoelectric current, was to be imaged on the pupil of the observer's eye. Thus at each end the maximum possible optical efficiency for utilizing the light was insured.

A Laboratories case "System of Television" was shortly authorized, and work initiated along the lines proposed. By May the apparatus was completed and in operation. A memorandum of May 12, 1925, by J. G. Roberts, General Patent Attorney, records: "I witnessed today a demonstration of Mr. Ives' system of television. He has constructed and put in operation substantially the system he described in his memorandum of January 23, 1925. In viewing the picture at the receiving end, I could distinguish with fair definition the features of a man's face like that of a picture at the transmitting end, and also observed that when the picture at the transmitting end was moved forward or backward, or up and down, the picture at the receiving end followed these motions exactly."

Early Use of Movie Film

Motion picture film in place of the stationary transparency was used in July, 1925, but was put aside because of the urgency of other developments of considerable promise. Cutting the apparatus in two and devising means for the synchronous operation of the two ends was undertaken on May 12. Two synchronous motors capable of driving the discs with a deviation of less than one-half the diameter of the disc apertures were delivered on November 25, and henceforth all the experiments were made with the sending and receiving ends working in different parts of the laboratory—the first step toward *tele*-vision.

A second development at this time was the design of a light source for the receiving end which did away with the original focusing of a point source on the eye. It consisted of a flat-cathode neon glow lamp, with a uniform bright area of glowing gas covering an area as large as the rectangle scanned by the disc. These lamps, used in all subsequent work, per-

The Laboratories television demonstration of 1927 as told by the *New York Times* at the left, and the *New York Herald Tribune* at the right



FAR-OFF SPEAKERS SEEN AS WELL AS HEARD HERE IN A TEST OF TELEVISION

LIKE A PHOTO COME TO LIFE

Hoover's Face Plainly Imaged as He Speaks in Washington.

THE FIRST TIME IN HISTORY

Phone Hides His Face.

At times the face of the Secretary could not be clearly distinguished. He looked down, as he read his speech, and held the telephone receiver up, so that it covered most of the lower part of his countenance. There was, too, much illumination also in the background of the screen. When he moved his face, his features became clear, distinguishable. Near the close of the talk he turned his head to one side and in profile his features became clear and full of detail.

On the smaller screen the face section were reproduced with fidelity.

After Mr. Hoover had spoken President J. J. Carty of the American Telephone and Telegraph Company

Speaker Seen, Heard Far Off By Television

Successful Test Brings Face and Voice of Hoover From Capital to Gifford, Head of A. T. & T., Here

Audience 'Looks In' On a Larger Screen

Vision and Speech Also Taken Successfully From Radio Station in Jersey

Walter S. Gifford, president of the American Telephone and Telegraph Company, sat down at a telephone here yesterday and not only talked to

Developed Television Test

Dr. Herbert E. Ives, American Telephone and

† Bell Laboratories Record, May 1947, p. 190.

mitted direct viewing of the image by both eyes, or even by several observers. The apparatus was no longer a "peep show."

With the two ends separated and with the flat-cathode glow lamps, motion pictures from a projector driving in synchronism with the discs were successfully reproduced in December, 1925. Further work on film was sidetracked by the development of a method of scanning objects without intermediate photographic amplification.

A Spot-Scanning Method

This beam, or spot, scanning method was devised by Frank Gray. It consists in directing an intense narrow beam of light on the subject and moving the beam rapidly across and from top to bottom on the field in a pattern traced out by the holes of the scanning disc. By this means the average illumination is reduced in the ratio of spot-to-field size (in our case 2,500 times) so that what would be intolerable as adequate floodlighting becomes almost unnoticeable, but remains equally efficient for scanning purposes.

This method, it was found, had been previously proposed but apparently with no realization of one of its major advantages: that it is not restricted in use to flat surfaces, as originally disclosed, but is suitable for objects in the round. With this method, light source and photocell are reversed in their role, and it is the photocells, not the light source, that should be made larger and manipulated in position. Cells in multiple, of a size never before attempted, were thenceforth used in appropriate positions around the scanned object.

On March 10, 1926, at the conclusion of ceremonies at Bell Telephone Laboratories commemorating the 50th anniversary of the telephone, Laboratory officials talked over a telephone, with the expressions and movements of the face of the speaker being clearly seen by the distant listener.

Had our conception of the problem been satisfied by the production of image dissecting and recovering apparatus, operable from one room to another, we could have designated and announced this apparatus as "television." From the beginning, however, it had been considered a necessary part of our obligation as an enterprise engaged in the transmission of information over great distances, to produce for vision a close parallel to what had been done for voice. It would be television when the laboratory experiment was expanded to cover distances beyond any the eye could reach.

Large Audience Viewing

Accordingly, consideration was given to the problem of putting the photoelectric signals on practical long-distance communication channels. The frequency range from 15 to 20,000 cycles per second generated by the apparatus had to be put on the transmission medium—wire line or radio—at the proper uniform level, free from phase shift, and delivered with the necessary amplification at the receiving end, a problem of the same sort, but of exaggerated scale, as in picture transmission.

While this work was under way, attention was turned to a method, outlined early in 1925, of exhibiting the picture to an audience of considerable size—the visual equivalent of a public address system. It employed a long neon tube containing 2,500 separate external electrodes, which was bent back and forth in 50 rows in such a way that there were 50 electrodes in each row. Signals were distributed by a commutator to each electrode in turn, in synchronism with the sending disc.

On the grid, .2 by 2½ feet in size, a human face and shoulders were reproduced in the pink glow of the neon gas and of a size and brilliancy sufficient to be seen in a moderate-sized auditorium. With a loudspeaker, it reproduced the voice and sight of the subject before the scanning transmitter.

In December, 1926, the characteristics of the line-coupling apparatus had been worked out, the "big screen" was functioning, and it appeared possible at an early date to stage a test of actual transmission of vision to a distance. In a memorandum of January 13, 1927, a program for several demonstrations was outlined. Subsequently, however, decision was made for a single demonstration to feature all the apparatus and both wire and radio transmission, by April, three months away. Washington was selected as the far point for the wire demonstration, and the Laboratories' station at Whippany, N. J., for the radio demonstration.

Immediately thereafter, the wire transmission arrangements were undertaken by A. T. & T. Additional loading coils had to be manufactured for the existing open-wire lines, cable connections between the Long Lines terminals and the demonstration centers had to be pro-

(Continued on page 32)

Effect of Electric Shock on Human Body

ELECTRIC SHOCK may be divided into two broad classes: those due to current from a continuously operating source, and those due to current from a sudden discharge. First, the current from a continuously operating source will be considered. These sources include power lines, whether A. C. or D. C., transformers, rectified power supplies after the initial contact, *etc.*

The most commonly accepted causes of death from electric current may be divided into three classes. First, the current may cause the heart or the brain to lose its power to react to a stimulus. Second, metabolism in the body may be so accellerated that the blood is deprived of its supply of oxygen, and asphyxiation results. Third, sudden violent muscular contractions may cause fatal hemorrhages in various parts of the body, especially in the brain.

Body Reaction to Shock

Artificial respiration may be effective as a restorative in the first two instances cited, and especially in the second. The first two causes result usually from more or less prolonged passage of current; while the third is usually the result of a sudden heavy current. The path which the current takes determines to a large extent the effect upon the body. A path through the heart is usually by far the most dangerous.

The current which may be safely passed through the body depends upon the frequency. Frequencies of from 50 to 150 cycles are the most dangerous. D. C. is considered to be equivalent to A. C. at 350 cycles. The human body readily tolerates the following for considerable periods of time: 8 ma. at 60 cycles, 30 ma. at 11,000 cycles, 800 ma. at 100,000 cycles, and 3,000 ma. at 1 million cycles.

While there is no close agreement by various investigators in the field, some sort of weighing of the available information would lead to the conclusion that 75 ma. of 60-cycle current and 150 ma. of D. C. should be considered as a dividing point between safe and dangerous currents. The resistance which the human body presents to an electric current depends largely upon the skin resistance and hence on the type and area of contact. In general it varies between 5,000 and 100,000 ohms in actual cases, with something of the order of 30,000 ohms being average.

D.C. Repels; A.C. Holds

D. C. usually kicks the subject away from the circuit; while A. C., especially at frequencies around 60 cycles, causes the subject to cling tighter to the circuit. Prolonged contact with the circuit usually causes more and more current to pass due to the breaking-down of skin resistance. Above 50,000 cycles the muscular contractions disappear.

United States Census figures show that about 500 people are killed by lightning each year, and about 750 by electric current. Insurance companies state that 50 per cent of electric accidents are fatal.

Danger from condenser charge has not been the subject of very extensive investigation. An early investigator found 400 joules fatal to a one-pound guinea pig, and concluded that the number of joules in the charge were more important than the voltage or initial current.

Modern Plastic vs. Glass Lenses

New-type lenses not regarded as meeting exacting requirements of precision-type, image-forming elements such as used in projection.

PLASTIC lenses are here, and they are here to stay and to benefit photography in a variety of ways. Yet they are different in many respects from what the average photographer expected plastic lenses to be.

To begin with, plastic lenses probably will not replace optical glass lenses in the smaller cameras. They become really economical only in the larger sizes—lenses of 2½ inches or more in diameter. In such sizes, and especially in the form of single-element lenses used in optical viewfinders, they are considerably cheaper than glass lenses but they are not "cheap" either in price or in the sense that they could be "stamped out" in quantity in a single operation.

It is true that workable methods have been developed for "stamping out" plastics lenses in large quantities. However, these are thin ophthalmic lenses used in eyeglasses. Because they are not image-forming lenses, minor optical flaws do not affect their performance. But when it comes to making thick, high-precision lens elements for photographic and other optical purposes, these shortcuts do not work. Too many of the lenses have to be discarded because of striae, strain, and other objectionable aberrations. On the other hand, the few plastics lenses remaining after discards have been rejected are of surprisingly good quality.

Production Time Cut Sharply

The best way of making plastics lenses is to grind and polish them, using methods similar to those employed in making lenses from optical glass. While it was necessary to design special equipment for thus handling plastics materials, it takes much less time to turn out a finished plastics lens than its equivalent in glass. The actual time required for machining, grinding, and polishing a plastics lens is only a few minutes for each operation, as against hours and days for glass lenses. And when it comes to tooling for new types and sizes of lenses, plastics required only a few days as against months for glass.

There are many other advantages. For instance, plastics lenses in their specially designed mounts weigh less than half as much as glass lenses, an important consideration in many respects—and quite important even to amateur photographers who want their equipment to be as light as possible.

No practical limitation exists on the size of plastics lenses, while it is difficult to obtain large chunks of optical glass from which precision lenses of large diameters could be ground. In the case of plastics, it is relatively easy to prepare a "blank" of any size and thickness. This blank can be examined very simply for optical flaws and discarded without too great a loss if it shows imperfections. The largest plastics lenses manufactured to date had a diameter of 18 inches, but at present one plant is working on an order calling for lenses of 40-inch diameter.

The light transmission of plastics lenses is high, averaging 92 per cent. In addition, the effective transmission can be increased by applying a magnesium fluoride coating, similar to the coating used on glass lenses. This is especially effective on the negative elements in a compound lens.

It is easy and safe to saw, shape, mill, rout, or drill plastics lenses, even after they are optically ground and polished. Special techniques have been developed to prevent distortion or strain caused by overheating during these operations. Thus one can take a round plastics lens and simply cut it down with a band saw into a square lens which will fit a viewfinder frame. Or one can drill holes into a large lens for mounting.

Finally, in the case of lenses several inches in diameter, plastics lenses become considerably cheaper than their glass equivalents. The reasons for this difference in price are the lower cost of the plastics as against optical glass, less expensive manufacturing processes, and less spoilage.

The only major disadvantage of these lenses is that they are more easily scratched than glass. However, they will stand up well under reasonably careful handling. In many military instruments the plastics lenses—and the glass lenses as well—are protected by covering them with a sheet of flat optical glass. While plastics lenses will scratch more easily than glass, they are practically unbreakable. One can drop them on a concrete floor and won't know the difference

The resins for the lenses are compounded in such a way that their optical properties closely resemble ordinary crown and flint optical glass. By varying the manufacturing process, many variations of the refractive index and the dispersion of the resulting resin can be achieved. At the present time, plastics lenses are made of three different kinds of resins. Two are similar to ordinary crown glass, the third is the equivalent of a high-index crown glass. If and when the more complicated types of compound lenses will be made of plastics, it will become necessary to develop additional types of resins.

Expansion Due to Heat

Mounting the plastics lenses offered some special problems. Heat expands the resins in these lenses from five to ten times as much as glass. This thermal expansion has to be considered in designing the lens mount, or the expanding lens will press against the mount, become distorted, and its performance will change. To avoid this, a shoulder is cut on the finished lens and room is left in the mount to allow for expansion.

While the material of these lenses is thermoplastic, meaning that it will change shape under sustained high temperatures, plastics lenses are stable for all practical purposes. They are fully stable in temperatures up to 150° F.

However, the main uses of plastics lenses will be in fields where they are not merely equal to glass but superior to it, or where the difference in price between the two will be greatly in favor of plastics.

25,000TH UNIT IN 25TH YEAR

Harry Strong, president of Strong Electric Corp., receiving name plate for 25,000th Strong rectifier from Charles Tuttle, plant superintendent. Strong organization is currently observing its 25th year in the manufacture of specialized projection equipment.



The *RCA Review*, quarterly technical journal of all RCA affiliates, has just published a two-volume index of all papers by RCA technicians in the *Review* and in other publications for the period, in Volume 1, from 1919-1945, and in Volume 2-A for 1946. Listings are indexed chronologically, alphabetically, by author and by subject.

Copies of this splendid compilation are obtainable from George W. Baker, editor of the *Review*, at RCA Laboratories, Princeton, N. J.

What is the Trend?

By HERBERT ALLER

Editor, International Photographer,
Business Manager, Cameramen's Local 659

AMERICAN business moves in cycles: just as periods of prosperity repeat, so do periods of depression. This fact has been repeated so many times as to seem a platitude, yet its workings must be faced and honestly evaluated. The motion picture industry is no exception in this round of events, and that being the industry in which we are most interested, let us analyze how this cycle may apply from the standpoints of exhibition and production.

The tremendous upsurge in profits began in 1939. The writer takes this as a starting date because he vividly recalls a management-labor negotiation in 1937 when RKO, through its then president, George Schafer, frankly admitted the company's inability to make a retroactive wage adjustment because of financial pressure. This incident remained in the writer's mind when the companies, sometime later, admitted they were uniformly "in the black," but here the hue and cry was the anticipated loss of the foreign market. (Hitler had begun his march to ruin, and it appeared that the foreign market would be entirely lost.)

Bigger and Costlier Pictures

With the advent of the war, a new theory was pursued: capitalization on the American market in every way possible. Production began to boom due to the producers' efforts to make as many pictures as possible, it being a foregone conclusion that eventually there would be a shortage of stars, technicians and supplies. Money derived from profits and transformed into expansion was taxable at lower rates than when registered as outright profits.

In addition, the armed forces needed entertainment and there was no way of knowing how long the war would last. With all these elements exerting pressure, the production boom began.

The popularity and the magnetic attractiveness to the box-office of double features already had been established. Single-feature runs were conspicuous because of the few cities where the patronage diffidently accepted the small and sometimes tasteless portion of entertainment. Money being plentiful and profits mounting beyond reasonable expectation, expensive and extensive production policies were adopted. It seemed that the more one put into a picture the greater was the return (*Gone with the Wind*, *Duel in the Sun* and *Night and Day*).

Public clamor for entertainment had begun its spiral upward. People were willing to spend money to be entertained. Apparently "easy come, easy go" became an accepted challenge to get everything possible out of life. At the same time theatres began to increase their runs, holding a picture over for a week, two, three, four and sometimes five weeks. With pictures performing phenomenally, the production schedule kept pace to build the backlog.

That the dog must sooner or later catch his own tail became only a question of time. A still greater danger loomed: pictures could become outdated as to people, costume, times, events, and even thinking. Another point was the inescapable labor turmoil; obviously, a backlog became a strong bulwark against the murky clouds that loomed on the horizon.

Selling Structure Altered

Wage increases were granted from year to year. Properly organized, the working craftsmen were able to achieve their aims. The effect upon the employers was nil, judging from the way the increases were reflected in the financial statements. However, the very small independents, making pictures in the $25,000 to $35,000 brackets, began their passing parade.

Did anyone know the trend? No, a most emphatic NO!

Larger independents sprang up in 1945 and by late 1946 had accumulated a backlog of 40 pictures through their key releasing organization known as United Artists. Universal changed hands, transforming itself into Universal-International. An immediate disclosure was made that "B" pictures and serials were out. Only "A" pictures would be produced.

All during such transition the entire selling process through which pictures had been merchandised was before the courts for adjudication. Block-booking apparently was doomed. The strong probability that production would be completely divorced from exhibition gained momentum. The extent to which this would go, and the specific manner of regulating the sale of pictures, remained a moot question because the duress could only be temporary in view of the pending appeals.

As it now stands, the situation appears rather ambiguous. Strangely, a business built on magic, fantasy and glamor and destined to entertain now becomes submerged under rigid rules patterned along income tax laws. Not to be overlooked are the ambiguity and lack of interpretation that follows: if the effect of the decree was to increase competition (and we have every right to assume that such was the purpose) then let us assume the result and ultimate effect.

We have what is apparently a free market. Following this, it is fair to assume that investors should be more anxious to finance motion pictures, theorizing that it is a cash business and historically gives a greater yield on the investment than any other business.

We come now to the conclusion and revert to our topic: "What is the trend?" With the free market there will be an onrush of independents once the backlogs are eliminated. Also, the smaller-budgeted independents will move up into higher brackets and offer competition to the majors. In time the public will make certain demands upon the producers. One unsuccessful picture will cause the producer to take stock. A period of unemployment will cause a tightening of the belts so that further

(*Continued on following page*)

Record Grosses, Nets, Dividends Reported For Films

	1946				1945			
	Gross	Net	Tax Provision	Dividends Paid	Gross	Net	Tax Provision	Dividends Paid
Columbia (a)	$ 46,510,909	$ 3,450,489	$ 3,550,000	$ 439,708	$ 36,013,753	$ 1,945,167	$ 1,703,687	$ 346,259*
Loew's (b)	188,476,317	17,958,945	12,929,627	8,248,588	175,534,918	12,913,369	10,483,001	6,951,016
Monogram (a)	6,235,228	379,474	399,841	.....	4,807,445	165,161	236,603	.....
Paramount	200,781,567	39,199,106	23,980,060	12,358,349	162,360,864	15,425,432	24,145,146	7,504,272
RKO	120,125,633	12,187,804	7,390,000	4,574,699	96,118,810	6,031,085	5,740,000	519,765
Republic	24,315,593 (c)	1,097,940 (c)	735,000 (c)	400,000 (c)	10,016,141 (d)	572,039 (d)	1,725,099 (d)	300,000 (d)
20th-Fox	200,529,482	22,619,535	14,650,000	11,304,906	185,672,542	12,746,467	21,650,000	6,418,459
Universal (e)	53,934,865	4,565,219	3,629,486	1,768,570	51,019,128	3,910,928	6,420,082	1,519,842
Warners (b)	163,908,141	19,424,680	18,500,000	8,327,451	146,618,251	9,901,563	16,700,000	.....
	$1,004,817,735	$120,883,162	$85,761,014	$47,422,274	$868,192,152	$63,611,211	$88,803,618	$23,559,613

* Plus stock; (a) Year ended June 30; (b) Year ended Aug. 31; (c) Year ended Oct. 26; (d) Jan. 1-Nov. 26; (e) Year ended Nov. 1.

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

VII

FROM the conflicts of the London weavers and the Exeter tailors, which were duplicated by other craft guilds in many English and Continental cities, the conclusion should not be formed that the guilds were composed of turbulent, law-defying men, or that their guilds had made them truculent.

That they had a respect for law and believed in it is shown by their strict obedience to their own self-made ordinances, and the strict discipline the guild wardens (business agents) maintained. It was only when authorities endeavored to secure control over the guild's internal affairs, or city corporations enacted measures to curtail the guild's authority over its members and passed ordinances which sought to disestablish them, that their members used their combined strength to protect their rights and the liberties which they had secured through union.

They made the same sturdy, determined resistance which free men have always made to protect their liberty and their property. They had grasped the basic fact that unless they remained free, those who made the laws, without labor having a voice, would shape them so that those who had could secure still more and those who were without organization could be more easily exploited.

Ancient Jurisdictional Disputes

The guild period could be held to prove that there is nothing new, for it contains a record of active jurisdictional disputes between guilds, some endeavoring to extend their jurisdictions at the expense of another; others endeavoring to do the work properly belonging to another because they were without work themselves. Two instances will serve to present the general picture.

In 1395 A.D., the king was making a formal entry into London City. A committee of the cobblers' guild (who were without a royal charter) appealed to the king to give them protection from the cordwainers' guild (the boot and shoe makers) which had a charter. The cobblers pleaded that they were being continually beaten up by the wardens of the cordwainers' guild, their tools broken, their small stock of leather destroyed, and their shops pulled down about their heads.

The cordwainers asserted that their charter guaranteed their right to mend as well as make boots, shoes and slippers. They asserted the cobblers were interlopers, and in any event so unskilled that customers were given such poor work as to bring the shoemakers' craft into disrepute. Another fact was that to secure work the cobbler worked for lower prices than the cordwainers charged, and used inferior leather. It was said that all cordwainers were honorable, highly skilled craftsmen; all cobblers incompetent and dishonest.

The king was much impressed by the cobblers' story. He instructed the mayor of London to call the cordwainers and cobblers before him and adjust their dispute. This the mayor did with almost Solomonic wisdom.

The Solomonic Decision

Twelve members of each group were sent for. After patiently listening to their charges and countercharges, the mayor decided that the cordwainers had undisputed jurisdiction over the making of all shoes, slippers and boots, and the mending (cobbling) of the footwear they had personally made. He also named all the types of leather they could keep in their workshops, and the tools they could use.

The cobblers were assigned the mending of all footwear which was brought to them, regardless of who brought it; the types of leather they could use, and the tools they could have in their little shops.

Whether the cordwainers and the cobblers lived happily ever after the record does not say, but thereafter the cordwainers' wardens gave their energies to other activities than beating up cobblers and otherwise mistreating them.

Hull on the Humber has been a shipbuilding locality for hundreds of years. In the guild days the city contained three woodworking guilds — the shipwrights, who built the ships; the carpenters who built the houses, and the joiners who made the chests and all other furniture which went into the homes and the ships.

The earliest records attest to jurisdictional clashes between the three guilds. Varying with the seasons and the other changes affecting business, one or two guilds were better employed than the third. There was no dispute over the lines of craft demarcation between the three guilds, but those craftsmen who were without employment sought to do the other's work. Apparently there were not a few opportunities for such intrusion into the other guilds' jurisdiction.

Those were the days, and they lasted well over a hundred years, when the principal occupation of wardens for the three guilds was to watch the members of the others to see that no poaching was taking place in their jurisdiction. What did they do when they caught some other craftsman poaching on their work? The written records of Hull fail to provide the answer, but since the wardens' salaries depended upon their giving satisfaction to their members, they, like moderns, probably desired to retain their positions.

Genesis of Freemasonry

Several most interesting accounts of journeymen's activities in Scotland have been preserved in the records of Masonic lodges. We are not here examining the origins of Freemasonry, but evidence is not lacking that as the guilds passed out of existence their fraternal and religious features, and their interesting traditions, attracted others so that in some instances the guild, no longer devoted primarily to craft interests, evolved into Masonic lodges.

Ancient records of a guild business meeting show that journeymen filed a complaint against certain master masons, charging them with failure to teach fully the "arts and mysteries of the craft" to apprentices. The guild instructed its wardens to visit four times a year every place where apprentices were being employed, and to report their findings to the guild.

Another record concerns charges made by journeymen against certain masters for employing "cowans" (non-members) to repair chimney pots, thereby throwing journeymen out of work. The guild's constitution provided expulsion for such an offense. The masters were found guilty, but as it was their first such offense they were let off with a public reprimand.

[To be Continued]

WHAT IS THE TREND?

(*Continued from preceding page*)

inducements will have to be given to the public to get people back into the theatre. Reducing admission prices will not alone solve the problem.

B's and Shorts Return

The instinct to fight off competition will be reborn and the major studios will start making "B" pictures and serials. (Tom Mix made Fox. Shirley Temple kept the studio open, and Deanna Durbin, at the age of 14, kept 1500 employees on the payroll at Universal.)

So, "B" pictures and serials will be used, not only to fight competition but to produce new talent and draw the attendance back to "standing room only." Within a year, there will be 48, 52, or even 60 pictures a year per major company. Merto-Goldwyn-Mayer has just admitted it may do 32 instead of 20 pictures a year.

Television, color photography and many other elements added, the trend will be more pictures, less extravagance and more cooperation between management and employees. Competition made this America a great country; competition will preserve it. So goes the trend, as the writer sees it.

INSPECTION FORMS NEEDED

(*Continued from page 6*)

sections which, stated the exchangemen, undoubtedly employed "inexperienced, unprofessional" projectionists.

Typical Exchange Viewpoint

Typical of the replies to "Pappy's" inquiries is the following excerpts from a statement by the Columbia Pictures exchange:

"Regarding film mutilation as noted in recent trade magazines, we wish to advise that all complaints in our inspection department were on films that had previously been shown in smaller situations. After writing 25 of these accounts, in addition to asking the aid of exhibitor organizations, we have finally stopped this mutilation.

"As far as we know, *not a single film* has been mutilated in *any* of our larger cities, and especially not in Dallas."

To which "Pappy" adds his own commentary that the "smaller situations" may be literally interpreted to mean the employment of "untrained, inexperienced, and wholly irresponsible juveniles who are known to receive weekly salaries approximating $1 per each year of their age."

The foregoing disposes of the Dallas situation insofar as members of the organized craft are concerned, but it should by no means end the craft's continuing interest in this subject nor deter it from taking positive steps to protect itself from what has always been and undoubtedly will continue to be a daily occurrence. Witness the alacrity with which the exhibitors in Texas jumped to pay the exchange bills for film already damaged, plus their promises for future good conduct so as to avoid any interruption in film service.

Inspection Forms Imperative

The craft might well take a leaf out of the exchanges' book. As suggested in the aforementioned *Monthly Chat*, let every theatre within a given jurisdiction be provided with a pad of report forms in duplicate on which would be entered, after close inspection, the exact physical condition of every foot of film comprising a show. This printed form should bear on its face a disclaimer of responsibility for any untoward happenings stemming from unsatisfactory condition of the film described thereon. The same form could be used to record the results of regular inspections of all projection room equipment.

One copy of this form should go to the theatre management; the other should be turned into the Local. This would place the responsibility for damaged film and deficient equipment squarely where it belongs and reduce materially those periodic swellings of Mr. Projectionist's jaw.

Moreover, it is not unlikely that the regular receipt by the theatre management of these printed forms, with the conspicuous disclaimer of responsibility on the part of the projectionist, would in the long run effect a marked improvement in projection room equipment overall.

Admissions Rise Comparatively Small

While the cost of food, clothing and other basic cost-of-living items has risen by half in the last few months, theater admissions, which were never controlled, have registered only a comparatively small rise. Latest figures by the Bureau of Labor Statistics show an overall rise in the index figure for adult admissions from the 1946 average of 157.8 to a February average of 165.4.

During the entire period from 1939 to now, the period of sharpest increase came between 1943 and 1944, when the index figure climbed by over 20 points for adults and nearly 24 points for children. This of course coincided with the increase in the admissions levy.

Famous Players Canadian Corp. net earnings in 1946 were $2,834,956, highest in its history and comparing with $1,594,973 in 1945. Deducting depreciation, income and excess profits taxes, earned surplus totalled $11,362,113. Net working capital is $7.884.428.



These grim faces may be your patrons, glaring at your booth—



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TELEVISION TODAY

(*Continued from page 8*)

dependability and quality of such transmissions are now in the main satisfactory. Certain details of operation may be added or improved in the future. For example, it might prove convenient to run certain types of film at any desired speed and yet transmit them at the standard number of frames per second. Experimentation on the remote control of film projectors from the television studio control room will doubtless be studied in the future.

Experimenters have indicated the possibility of recording television programs on 16- or 35-mm film, with the accompanying sound. Such film serves as a permanent record of the program, and provides for its later repetition or for its syndication on a transcription basis.

Another application of the recording of a television program on film is in the field of theatre presentation. If a television program is received in a theatre, photographed on film, developed at high speed, and then projected on the theatre screen, it offers one method of large-screen television for theatre purposes. The use of television in theatres is a field under development, and one having attractive possibilities.

The program structure of today is relatively simple and is based largely on the most ecomonical production for a limited number of operating hours per week. The future still presents numerous program problems. It will become necessary to present a far wider variety of program types, and to learn how to produce thoroughly attractive program material on a large-scale and economical basis. Television on such an expanded scale will require locating and training large groups of skilled personnel capable of meeting television-program needs.

Closely tied into the program problems of the future are certain economic questions which must be studied. It reremains to determine the most desirable number of stations in each type and size of community, the sort of programs which should be transmitted, and the measure of sponsor support which will be necessary to provide adequate program service in various sorts of communities. To determine these factors may involve the detailed and continued study of audience reactions to an extent not yet found necessary in radio broadcasting.

Networks a Complex Task

As of the end of 1946, more than 3,000 miles of coaxial cable and many hundreds of miles of radio-relay systems have been established. By 1950, it is stated that 12,000 miles of coaxial cable capable of carrying television programs will form a national network. No rate structure has as yet been established for the use of such facilities. It will be a complex task, though a promising one, to provide nationwide, high-fidelity, black-and-white television syndication on an economic basis. The prospects are hopeful in view of the many conceivable and profitable by-product uses of the wide-channel circuits required for television syndication.

To secure maximum flexibility and greatest usefulness of networks for television program distribution, it is desirable that the engineers develop standards and simplifications in the use of cables, wave guides, and radio-relay systems. Interchangeable operation of standard equipment will thus be promoted . It may be added that, when color television becomes commercial, network operations will present technical and economic problems of increased difficulty.

One television problem, shared with other higher-frequency services. and as

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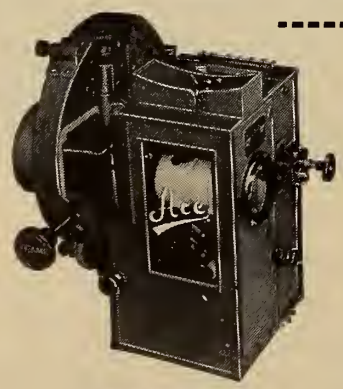
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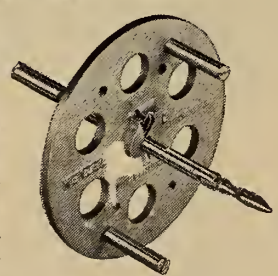
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yet almost untouched is that of providing large-area rural television coverage in non-mountainous regions and controlling the corresponding transmissions from national networks. In view of all that television can offer the farmer, it is greatly to be hoped that a solution will be found for this problem. To some extent such a solution will be "tied in" with detailed studies of wave-propagation from stations of various carrier frequencies, powers, and heights above ground.

The Receiver Problem

Present-day television receivers operate on signals transmitted on 13 black-and-white channels, each six megacycles wide, and located in groups between 44 and 216 megacycles. Some of the receivers show pictures by direct viewing and others by projection of an intensely brilliant image through a high-efficiency optical system. Other optical methods of enlarging pictures efficiently have been considered.

The present-day picture is a 525-line (nominal) image with slightly greater resolution vertically than horizontally. Its brightness is of the order of 20-60 foot-lamberts, which is a marked improvement on earlier pictures and adequate for home reception under normal conditions. The gradation range of the picture has been greatly increased.

Television receivers of today are compact, attractive in appearance, and easily handled by most persons. They may fairly be said to be far in advance, in their stage of technical and operating development, of the radio receivers of the mid-1920's during the period of the vast expansion of radio broadcasting.

Home antennas are mostly of the dipole type, using one or more of such elements with or without passive reflectors. The problem of providing television service in multiple-apartment dwellings has been studied in principle. It involves centralized antenna, amplifier, and distribution systems leading to the various apartments. Technically, such systems seem practicable. Their economies—as well as the landlord reaction to their installation—remain to be explored.

Television still offers a number of questions to the analyst. It is not known what number of available channels would meet all reasonable requirements in each type and size of community. The relative status and feasibility of operation on 44-216 megacycles versus operation on 480-920 megacycles (or even operation on frequencies well above 3000 or even 5000 megacycles) will require more technical work and field experimentation than has yet been devoted to this important question. Then, too, as picture size increases in the home, it may be found that 525-line pictures are still entirely adequate—or, alternatively, it may prove desirable to go to pictures of greater resolution. This last question, however, is far from urgent, since it is generally agreed that the 525-line picture is capable of giving continuing entertainment value.

One element of television which cannot be slighted is high-quality servicing. The installation and maintenance of television receivers can be handled only by highly qualified servicemen. Such men are being supplied by the television-receiver manufacturers or by organizations sponsored by such manufacturers. This is a wise and helpful procedure.

Satisfaction in television reception depends upon the absence of visible interference with the picture and audible interference with the sound portion of the program. It is well known that certain medical and industrial equipment, such as diathermy apparatus, industrial-heating devices, and some automobile ignition systems may seriously affect picture quality and cause noticeable interference with the sound portion of the program. A combination of regulatory measures and public education may lead to the reduction or elimination of such disturbances.

Those who watched the early development of radio broadcasting will recall the serious interference which resulted from radiating receivers. This possibility has already been found to exist in television. The elimination of such interference will require agreement on engineer-



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GENERAL ELECTRIC

ing standards of good practice for "non-radiating" receivers, and possibly the promulgation of corresponding regulations as to permissible field strength at specific distances from suitably designed television receivers.

Perhaps the least studied portion of the basis of television today is its psycho-physical background. The effect of various types of image presentation upon the observer merits, and will doubtless receive, careful investigation and analysis in the future. The improvements which would result in the entertainment value of television would probably repay extensive investigations along psycho-physical lines.

Color television is a more complicated matter than most enthusiasts in that field appreciate at this time. Our knowledge of color reproduction methods, and of their desirability in television, is certainly in its early stages in some respects. Also under active analysis are questions of the economics of color television involving transmitter cost, studio and program operation costs, and receiver costs. It is evident, however, that a healthy development trend exists in color television and that, in the years to come, this art may also find its sphere of application in home entertainment.

Some workers have, from time to time, discussed stereoscopic television, in black-and-white or color. The subject is of limited interest at present but may attract increasing attention in time.

It may also be mentioned that important industrial television applications, as well as uses of television in military and other fields, will increase in number and grow in value.

Some Remaining Problems

As of the close of 1946, it has been fundamentally established that television broadcasting is an outstanding contribution to mass communication and that it rests on basically correct technical, esthetic, and long-term commercial grounds.

Among its remaining problems are further simplification of equipment and operations, achievement of large-scale and high-quality production and reproduction, expansion of the scope and coverage of television programs, development of coordination between television and other methods of entertainment and instruction, the maintenance of a constructive and helpful attitude on the part of the governmental regulatory authorities, the growth of intra-industry cooperation, and the gradual evolution of television toward even greater technical and artistic capabilities and achievements.

Considering its present capabilities and accomplishments, television presents most attractive and hopeful vistas of future achievements and universal acceptance.

SMPE N. Y. Meeting to Feature Theatre Engineering Problems

The next semi-annual convention of the S.M.P.E., at the Hotel Pennsylvania, N. Y. City, Oct. 20-24, will feature a Theatre Engineering Conference in anticipation of extensive building and modernization in the 1947-48 season. The convention will be principally devoted to theatre design and construction topics, including acoustics, lighting, seating, ventilating, floor covering, decorating and display, with special emphasis on public safety.

Also on the agenda will be a symposium on theatre design for television. An exhibit of materiels and equipment for theatres will be provided, with architects being asked to supply pictures, sketches and models of novel design.



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PERSONAL NOTES

DON TURNER who joined Erpi in 1929 and recently has been with International Business Machines, has rejoined Altec Service as co-manager, with N. L. MOWER, of the Atlanta district. TURNER was previously Altec's commercial engineering manager and had also been with Globe Wireless Co.

* * *

CHARLES WILLIAMS and JAMES ROUNTREE have acquired an interest in Associated Industries Co., exclusive DeVry distributors in Texas for all types of 16- and 35-mm sound equipment, according to word from DAVE ("Pop") HAINES, general manager of the company. Also, JOSEPH QUIJDA has joined the firm to service the growing Spanish-speaking trade.

* * *

LANE PATTON, veteran 20-year theatre soundman and recently engineering supervisor for Altec's commercial engineering



Lane Patton

group, has been named district manager for Altec in the Atlanta area. "Pat" knows every phase of sound reproduction servicing, having gone from W. E. to Erpi to Altec. In addition, he is chief editor of the *Altec Exchange*, a compendium of news and new service ideas from the fieldmen.

* * *

HARRY SMITH, JR., executive secretary of the Society of Motion Picture Engineers and editor of the Society's monthly *Journal* for the past four years, is leaving the organization on July 1 to go into business for himself. Smith joined the Society as executive secretary in March, 1943, after being associated with the Hays Office for several years. In October, 1943, he also took over the editorship of the *Journal*.

Smith's new venture will be outside the motion picture industry, with headquarters in Florida.

* * *

Beaucoup personnel shifts by Altec Service Corp. to take care of greatly increased number of accounts. MILTON THOMAS, branch manager at Cincinnati, which town he has graced for more than 15 years, has been named district manager. KENNY KAISER, another old-timer, from Texas to the Louisville area. ED PERRY, a native of Norfolk, Va., where he is a member of I. A. Local 550, has been added to the service staff in that area.

FRANK J. HOMSHER has been transferred from Baltimore to Pittsburgh. C. S. LUNDY has established headquarters in Lansing, Mich., part of the Detroit district. During the war LUNDY worked on the Navy Mark I gun trainer project.

In California, S. S. MILLER goes to San Diego; HAROLD NELSON, who before the war was in the San Francisco area, is now assigned to Stockton, and ROBERT K. REGAN will work in the Northern area.

Incidentally, Altec has contracted with the Navy to service all Mark I and Mark III gunnery trainers now installed throughout the U. S. and to supervise the installation of 36 additional Mark III trainers.

Ampros Now Made in England

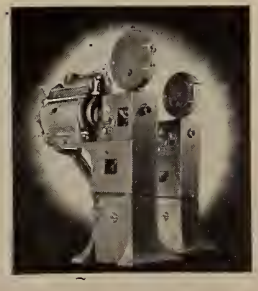
Ampro Corp., of Chicago, has completed arrangements for the manufacture of their 16-mm silent and sound film projectors in Great Britain. A newly-formed distributing company, Simplex-Ampro, Ltd., at 167 Wardour St., London, W. 1, will direct the sale of Ampro products in Great Britain, Ireland and the Continental markets.

EVERYTHING FOR DRIVE-IN THEATER OPERATION



Drive-in theater operators look to DeVry for more than dependable moderately priced projection and amplifying equipment. DeVry's new IN-CAR SPEAKERS are another outstanding contribution by DeVry to the Exhibitor's and Projectionist's goal—the perfect show.

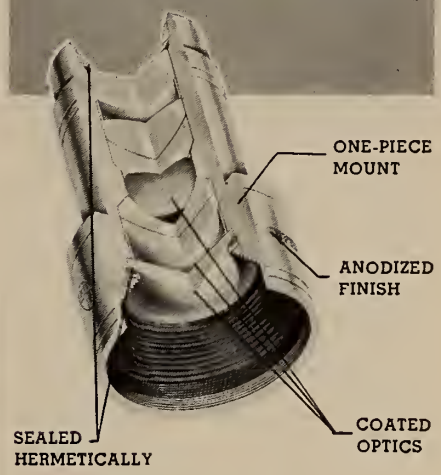
DeVry IN-CAR SPEAKERS permit closed windows in bad weather; provide individual volume control to patron's taste; confine sound to immediate theater area, eliminating community complaints; give farthest-parked patron uniform synchronization of sound with action. Don't delay. . . . Place your order for IN-CAR SPEAKERS now and assure on-time delivery.



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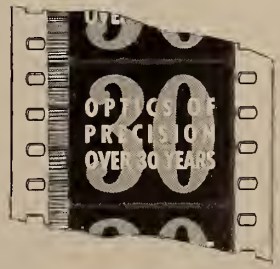
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IN THE SPOTLIGHT

(*Continued from page* 19)

exhibitor in Cleveland, was fond of telling the story of how surprised and chagrined he was when his son, Charlie, who was employed as projectionist at one of his father's theatres, walked out on his job when Local 160 called its first strike.

We last talked with Charlie at the 1946 Chicago Convention, and although it was shortly after his discharge from the hospital where he spent some time undergoing treatments, he did not let his poor health dampen his spirits. He was the same genial personality we had known for many years. He will be missed by all who knew him. We extend our deepest sympathy to his survivors.

Funeral services were conducted by Meridian Lodge No. 610, Free & Accepted Masons. He is survived by his wife, five children, mother, sister and two brothers.

● We were visited several weeks ago by Robert Sauve, member of Shenandoah, Iowa, Local 610, working in the jurisdiction of Local 286, Des Moines, Iowa. He came on to New York to visit his new grandchild, and although it was his first visit to our city, he liked it so well that he expressed a desire to make it his home some day.

● Incensed because their projectionists banded together and organized I. A. Local Union 806, the exhibitors of Carlsbad, New Mexico, discharged from their employ all men who joined the union, and refused to negotiate new contracts with the officials of the Local. A strike was called by Local 806 and all the theatres were picketed. After 76 days of picketing a Citizens Committee was formed by the various civic organizations in Carlsbad for the purpose of arbitrating the dispute between the union and the exhibitors, but it failed of its purpose. Latest reports received by this department indicate that the strike still is in effect and the matter hopelessly deadlocked.

● We were deeply grieved to learn of the sudden death on June 7 of our very good friend, Charles Beckman, financial-secretary of New York Local 306. Although Charlie had been ailing off and on for a number of years, he recently returned to his desk after an absence of several months. The day before he died he seemed to be in particularly fine spirits, joking and kidding with other members of the Local.

Charlie became a member of Local 306 in 1922 when the old American Theatre Employees (ATE) group from Brooklyn was taken into 306 membership. He was extremely popular with his fellow members and served in an official capacity with several administrations. He was a loyal unionist and a sincere official. Local 306 has lost one of its most faithful workers. A son, Charles, Jr., is also a member of the Local.

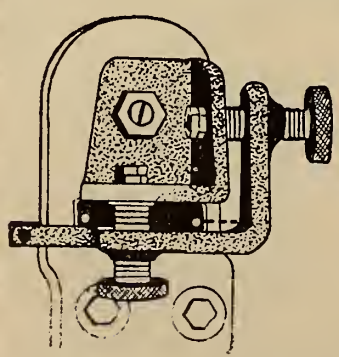
We offer our sincere condolences to his family.

● The Gene Atkinsons, Chicago Local 110, are ardent disciples of Isaac Walton. While vacationing in Stuart, Fla., last winter Gene and Tommy (Mrs.) Atkinson competed with each other in a fishing tournament in order to settle the question as to who was the better fisherman. It turned out to be a one-sided affair, however, when Tommy caught a fish measuring 7 ft. 8 in. long, weighing 65 pounds. The less said about Gene's catch the better—it was nil.

A certificate from the Stuart Chamber of Commerce is one of Tommy's prized possessions and holds the place of honor in the Atkinson menage. Whenever Gene feels inclined to brag about his prowess as a fisherman, a glance at the framed certificate is sufficient to make him change the subject.

● "The best banquet we ever attended," was the opinion voiced by all those who attended the recent annual banquet given by Local 623, West Palm Beach, Fla. The party was attended by every member and officer of the Local. Among the prominent citizens of West Palm Beach present were C. W. Bowman, Joe Hunt and A. Allison. R. H. (Red) Johnson, of Local 623, was toastmaster for the occasion and worked in his usual smooth fashion.

Serving on the committee in charge of arrangements were J. W. Cummings, Charles W. P. Crow, R. H. Johnson, and Earl H. Hite. Guests from other I. A. Locals included the following: Alvin A. Levine, Local 379, Perth Amboy, N. J.; Geo. J. Kamm, Local 682,



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Lancaster, Penna.; F. T. Stark and G. W. Stark, Local 253, Rochester, N. Y.; and J. F. Ingels, Local 558, Daytona Beach, Fla.

● Harry Abbott, president of Philadelphia Local 307, appointed Charlie Humphries to the office of secretary-treasurer, to complete the term of the late Willie Friedman.

● The 35th Anniversary Dinner-Dance of Local 224, Washington, D. C., held at the National Airport last month, was a grand party. It was attended by the entire Local membership and many out-of-town guests. Delicious food, music, dancing, and prizes were the order of the evening.

I. A. President Walsh, who attended, made a brief address commending Local 224 on its record of progress through the years. Other guests present included Lester B. Isaac, supervisor of sound and projection for Loew's, Inc.; Wm. Bennett, business agent of Washington Local 22, and many other officials from nearby I. A. Local Unions and from the Central Labor Union.

Tom Reed, member of Local 224, was the toastmaster of the evening and turned in his usual fine job. We consider Reed to be one of the finest orators in the I. A., an opinion shared by many of the delegates at the last I. A. Convention who heard him make a nominating speech.

● After several months of negotiations, Vancouver Local 348 has concluded contracts for all theatres in its jurisdiction, with the exception of two independents, who are expected to fall in line shortly. The new contracts call for a 20c per hour increase; time and one-half pay after 36 hours in the downtown theatres, and after 32 hours in the suburban houses; vacations with pay for each man after three years service, and retroactive pay to January 13, 1947, based on a 15c per hour increase. Contracts run to August 31, 1949.

Incidentally, Victor Armand, of Famous Players Canadian, and former member of Calgary Local 302, was on his way to Vancouver to negotiate new contracts with Local 348 officials when his plane was lost en route.

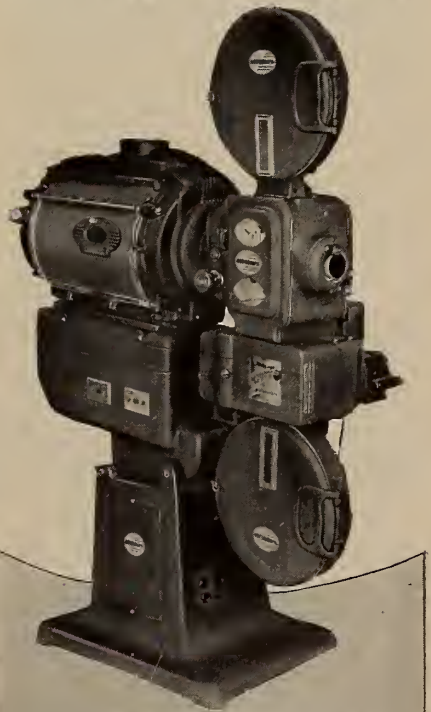
● Max G. Miller, vice-president of Local 521, Long Beach, Calif., is the national recruiting and manning officer of the Merchant Marine Veterans of America, a non-profit, non-sectarian organization chartered July 1946 under the laws of California. This organization was formed for the purpose of obtaining for its members, many of whom were wounded and disabled in the line of duty, the rights, privileges and benefits accorded to veterans of the Armed Forces.

The U. S. Merchant Marine covered itself with glory in the recent World War, and although many of its men were awarded medals and ribbons for bravery under fire, they are not eligible under existing regulations to receive any of the benefits enjoyed by members of other branches of the service.

The MMVA is making every effort to assist needy merchant marine veterans and their families, and is carefully watching all pending legislation affecting the status of these men. Further particulars about this organization may be obtained by addressing Miller in care of the organization's headquarters, 2450 Armstrong Ave., Los Angeles 26, Cal.

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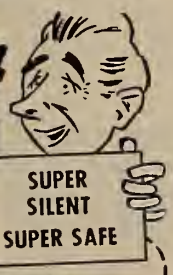


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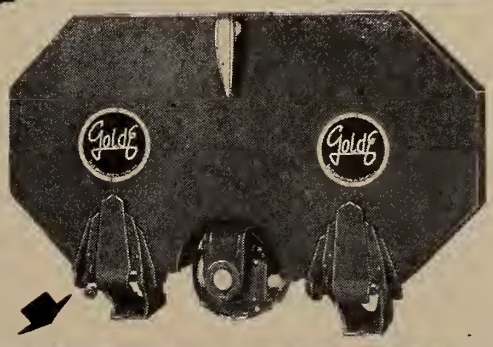
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Modern, Compact Design • "Tilt-back" Case . . . Reels Can't Fly Off

20th VIDEO ANNIVERSARY

(*Continued from page* 21)

vided, and the whole procedure for maintaining line characteristics set up.

A frequency of 1,570 kilocycles was selected, and a complete radio sending station capable of transmitting the new type of signal was assembled, together with suitable receiving apparatus for use at the New York end of the radio circuit. A small building in Washington near the telephone office was rented and equipped. A large amount of duplicate apparatus had to be built to handle the multiple demonstration program. All the work had to be scheduled to come through in proper sequence and date, involving the cooperation of many departments.

In the log book already quoted, the entry for April 7, 1927, is "Television demonstrated." The stage was the Laboratories' auditorium at 463 West Street, N. Y. City, which was equipped with apparatus for sending and receiving locally, and for receiving television programs from Washington and Whippany. The principal event was an address by Herbert Hoover, then Secretary of Commerce. As he spoke in Washington, his face was shown on the large screen to a group of 50 guests in New York while his voice was heard from an associated loudspeaker.

Following this, a program of amateur vaudeville was sent by radio from Whippany and similarly viewed. Then guests in Washington were individually seen and talked with by friends in New York, using the small individual receiving discs. Local transmission at either end made it possible for all to comprehend the process of image analysis, transmission and recomposition.

Essentials Laid by 1928

In the years immediately following, a number of developments were announced which together embraced practically all the applications of television that have thus far offered promise of general use. In 1928, the development of large-dimension apparatus of great light-gathering power permitted outdoor scenes to be televised by daylight. In 1929, television in color by a three-color, three-channel method was shown. In 1930, a complete two-way telephone-television system was set up between the Laboratories and 195 Broadway. It was maintained for over a year, and was used by more than 10,000 people.

While these developments were not ready for exhibition in 1927, they were nevertheless all scheduled and in part worked out then, so that they belong properly in the account of the launching of television at that time.

In the 20 years that have elapsed since these pioneering developments, the "head-and-shoulders" target of the first television scanning have expanded into the extended scene of the stage and arena. For the greater sensitiveness and rendering of detail necessary, electronic scanning methods have in large part superseded the earlier mechanical devices.

For the study of the transmission problem, which is the peculiar obligation of the telephone industry, the apparatus of 1927 served well. By its use the fundamental data were obtained which guided in the transition from the open-wire line to the coaxial cable, on which television images were transmitted ten years later in 1937, and from line-of-sight radio to the radio relay of 1947 .

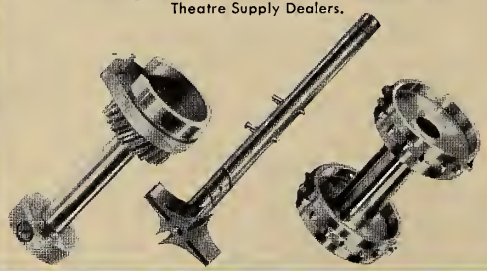


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18,765 Theatres in U. S.

Motion picture theatres operating in the world as of Jan. 1 totaled 83,668, according to figures from the 1947 Film Daily Year Book of Motion Pictures. Theatres in North America totaled 20,115, with 18,765 in the U. S. and 1,350 in Canada. European theatres totaled 48,833; Latin America, 6,710; Far East, 5,663; Near East, 235; Africa, 1,357; Caribbean Area, 596; British West Indies, 82, and the Atlantic Islands, 77.

United States theatres at the first of the year totaled 20,306 houses in 10,238 cities and towns, with a total seating capacity of 11,989,828. Of these, however, 1,541 theatres with 596,168 seats were shuttered. There were 11,393,660 seats in the 18,765 theatres operating on Jan. 1.

NEW BOOKS RECEIVED

HISTORY for the scientist and science for the historian are offered in "The Path of Science," the new book by Dr. C. E. K. Mees, vice-president of Eastman Kodak Co. in charge of research and development. Just published by John Wiley and Sons, Inc., in New York, the book deals with the growth of science through the ages and its relation to society today. Material in the book is based on the Hitchcock lectures delivered by Dr. Mees at the University of California in 1943.

After discussing the interpretation of history and a convenient helical theory for representing the growth of knowledge, Dr. Mees considers in his book the development of the scientific method and relates it to the founding of physics, chemistry, and biology.

The part played by industrial research in the production of scientific knowledge is also considered by Dr. Mees, who has directed Kodak Research Laboratories since their founding in 1912. One of his conclusions is the expectation that much of the responsibility for research in pure science may eventually be transferred to institutes devoted to special branches of science and probably supported by public funds.

Dr. Mees says that the progress of science today is so rapid that it challenges the ability of leaders to meet the social changes that it produces.

"While the techniques of the physical sciences cannot be transferred to the field of sociology," Dr. Mees writes in considering social change, "the scientific method itself can and must be used for the study of the structure of society, its reaction to changing conditions, and the adjustments required to enable it to retain stability as those conditions change."

New Motiograph Foreign Distributor

Motiograph, Inc., announces that its products—projectors, sound systems, arc lamps and rectifiers—will in the future be distributed throughout the world by Frazar & Hansen, Ltd., of San Francisco. The latter firm, established in 1834, also handle products of Altec-Lansing, Strong Electric Corp., and other manufacturers and are thus in a position to completely equip a film theatre.

In the U. S. A. Motiograph distribution is through independent supply dealers. In Canada, Dominion Sound Equipment, Ltd., represent Motiograph; while Hawaii and Alaska are serviced by B. F. Shearer Co., San Francisco and Seattle.

0.943 Correct Sprocket Diameter

The new intermittent sprocket for 35-mm projectors proposed by the S.M.P.E., and expected to be validated shortly by the American Standards Association, is 0.943 inch in diameter, *not* 0.945 inch as erroneously stated in the closing paragraphs of the article "A Standard 0.943 Intermittent Sprocket" in I. P. for May (p. 5). The 0.945 dimension crept into the article at the close through a mention of its use in certain European equipments.

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RCA Pits 'Live' vs. Reproduced Music in Unique Critical Test

Seemingly in conflict with the conclusions reached by two recent articles in I. P.[1] is the assertion by RCA that it recently presented "dramatic proof" of its ability to reproduce music with such fidelity as to be virtually indistinguishable by a critical audience from "live" music. The RCA test was held at the recent Chicago convention of the National Association of Music Merchants.

The demonstration consisted of the alternate playing of a piano in the RCA hotel showroom in view of the assembled guests, and the playing of an identical piano in another room of the hotel, with the latter music being picked up by a microphone and transmitted to a radio receiver near the piano in the showroom.

Guests were invited to turn their backs to the stage and indicate by pressing a button on the end of a long extension cord whether they thought they were hearing the piano in the room with them or the music coming from the radio receiver. In a preview demonstration, participants' guesses as registered on a four-panel shadow box at one end of the stage were wrong more than 50 per cent of the time.

The two upper panels of the shadow box bore images of a piano and the "Golden Throat" symbol representing RCA's new tone system, which were illuminated alternately to indicate whether the music heard at any given moment was actually coming from the piano or the radio. One or the other of two panels in the lower half of the shadow box, bearing the same symbols, was illuminated whenever a participant pressed a button, permitting other guests to tell at a glance whether he or she had guessed correctly. Special meters atop the shadow box clocked the percentage of right and wrong guesses.

A small, low-powered transmitter was used to broadcast the music of the remote piano to the console radio receiver.

[1] " 'Quality' vs. 'Pleasing' Sound Reproduction," by J. Moir; I. P. for February, 1947 (p. 5) and May, 1947 (p. 16).

Conditions Control Results

Illustrative of the extreme importance of the *conditions* relative to both technique and equipment used in connection with all such tests is the following statement made by RCA to I. P.:

"It appears that the radio tone demonstration we gave in Chicago at the NAMMM convention could hardly be related to theatre sound reproduction, since the fidelity of tone of the Chicago test is a product of the Golden Throat Tone System used in our radios and phonographs and involves matched acoustical characteristics in speaker, amplifier and cabinet.

"Although the high fidelity sound reproduction provided by our theatre sound equipment is widely recognized, no direct comparison could be made between theatre sound and radio sound.

"Regarding the results of the British tests as published in I. P., we do not believe that the findings of our tone demonstration offer any conflict. Our demonstration was intended only to show that it was impossible for the average listener to distinguish between the radio tone and the live music, and did not deal with the question of *what type of tone* is preferred by listeners."

Tall Corn Country Corn

Laugh of the month was provided by Charles L. Jones, Iowa hamlet exhibitor, in protesting against the inocuous and long-overdue building-construction bill now pending in that State's legislature. Said Jones, in part:

> "I feel this bill would authorize a standardizing of booths . . . at great expense to all theatres. I believe in full safety and would agree that new construction be installed in an approved, standardized way; but to have to change an already established . . . room, with its vast amount of wiring would be prohibitive."

Reversing his field, Jonesy proceeded to expose his silliness and to incriminate himself and other exhibitors like him. Get this jewel of rationalization:

> "No one is more conscious of film fire than I. I had a projection room fire six weeks after opening my theatre. My booth kept the fire within its walls, and there was no damage other than smoke and water to other parts of the theatre. My projection room is NOW better than before."

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MONTHLY CHAT

(*Continued from page* 3)

the point of actual hurt, and the recalcitrant must be made to know the feel of the curb and bit.

The job to be done here—the job that should have been done oh, so long ago—is one peculiarly for the projectionist craft. There is no need to labor the point that no other element of this industry of ours whose chief stock in trade is the portraying of the humanities will do the job for the craft. In fact, no craft is worthy of that appelation if it decline to see this matter through.

Nothing but frustration awaits those who seek to do this job on either a national or state-wide basis: the record in the Shea case conclusively proves that. The work must be done on a strictly local level.

The motion picture projection process that utilizes a carbon arc and nitrocellulose film stock must be classified as a matter of law as a hazardous occupation that may be pursued only by an adult of proper aptitude and experience as determined by an inclusive examination, the scoring of a passing grade in which shall be attested to by the issuance of a license.

It will not suffice, either for other 15-year-old possible victims of indecency and greed or for the protection of the theatre-going public, to shrug off this matter with the casual observation that "Our town hasn't any kid projectionists". If the possibility that such a circumstance might eventuate be so remote, then the effort to get it down in writing as a local law should encounter no opposition.

Do it now, and never desist until the job is done. We owe that much at least to the Shea kid.

Exchange Safety Record

Thirty thousand miles of motion picture film were handled every day in film exchanges in the United States in 1946 without a single death or injury or one dollar of fire loss in any exchange operated by a member company of the Motion Picture Association. It was the 10th year since 1926 that the department was able to report "no losses," and average yearly losses from 1926 through 1946, inclusive, have been only $231.14, a result of "eternal vigilance," reported A. S. Dickinson, head of the department.

One Exchange Fire in 1946

The only reported film handling fire anywhere in the United States in 1946 was in Chicago, in an independently operated film exchange outside of the scope of MPA inspections, and resulted in the death of one person and a monetary loss of $500. A carelessly discarded cigarette fell into a drum of wornout film.



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A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only $3 per copy, postage prepaid.

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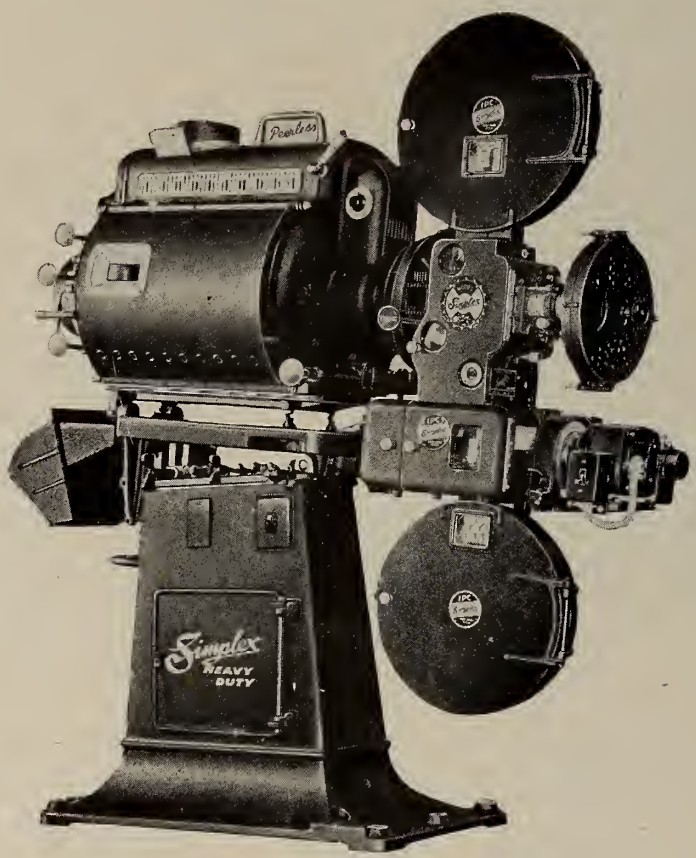
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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 22 JULY 1947 *Number* 7

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MONTHLY CHAT

PERUSAL of the recently-enacted Labor-Management Act of 1947 (commonly referred to as the Taft-Hartley bill) makes it obvious that it will disrupt the procedure long adhered to by the I. A. in its negotiations with employers. Significantly, however, and running directly counter to the oft-repeated statements by its sponsors that the Act is a model of clarity, is the fact that Labor in general looks to impending court actions, which will be rushed, for final clarification.

Labor unions at this time just can't calculate the ultimate effects of the T-H legislation; neither can employers; and there is a strong probability that some of the Act's more restrictive sections will be repealed—and soon. Senator Taft himself is reported willing to back repeal of the provision which would make it illegal for any publication wholly supported by union members' funds to oppose or back candidates for political office.

Testifying to Labor's present indecision and its determination to move cautiously is the preliminary analysis of the Act sent to all I. A. locals recently by the I. A. General Office.

Pointing out that the I. A. has operated on a closed shop policy for more than 50 years, the I. A. nevertheless stresses the fact that all closed shop contracts entered into *for whatever period* prior to June 23, 1947 continue to be effective until they terminate. Also, any Local may, up to August 23, 1947, execute a closed shop contract to endure for not longer than one year. Of course, State laws, some of which prohibit such contracts, must be considered.

Of outstanding importance is the fact that the Act "in all aspects," is limited to those matters arising out of interstate commerce, or where labor problems would tend to "burden, obstruct, or interfere with the free flow of interstate commerce." Now arises the prize question: Are studio workers engaged in interstate commerce? Are exchange workers? Are stagehands? Are projectionists?

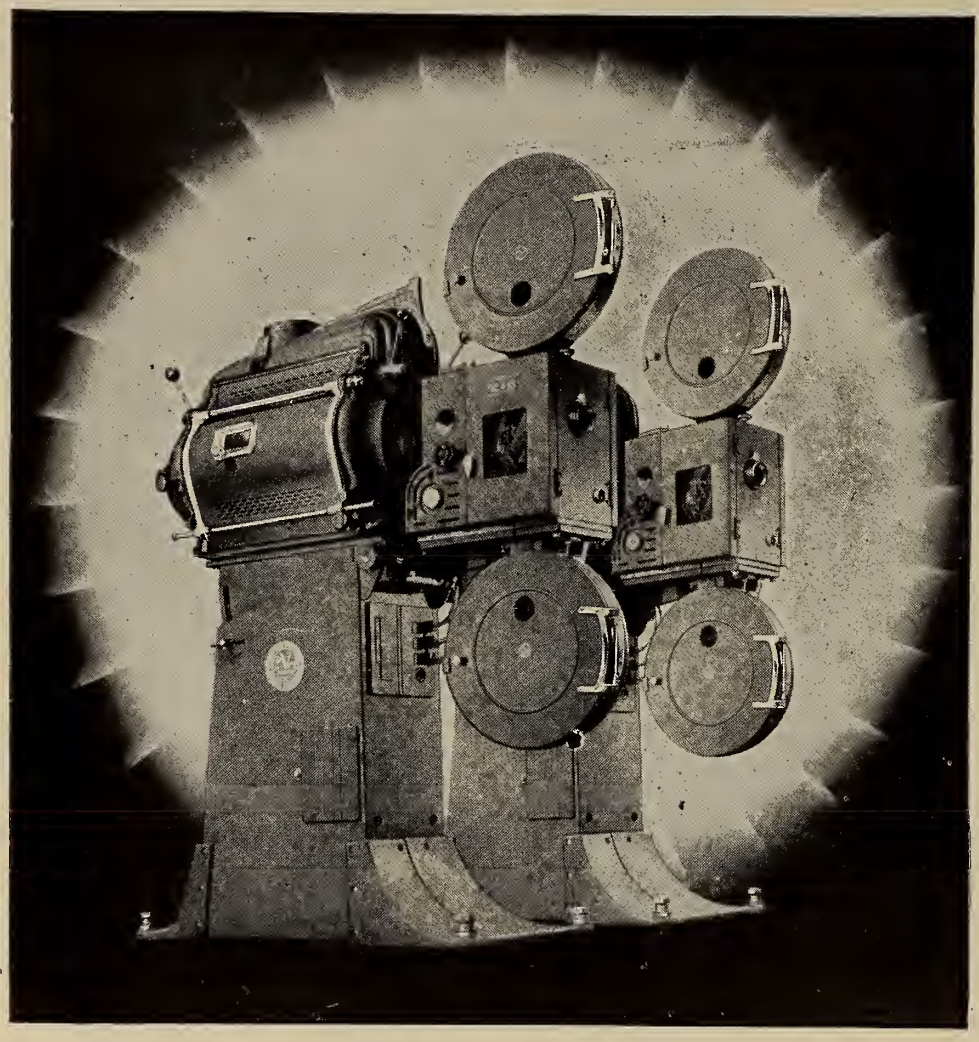
There is a tendency in Union circles to give stagehands and projectionists a pass on the interstate commerce angle, although nothing is certain as yet; but it would seem that exchange workers and studio people are definitely "in".

Also of considerable interest is the "union shop" principle, as contrasted with a closed shop. In the latter an employer may hire only men who are already members of a certain union. In a union shop an agreement is permitted whereby the employer may hire anybody but the worker must join the union within thirty days or else forfeit his post.

This union shop procedure requires

(*Continued on page* 34)

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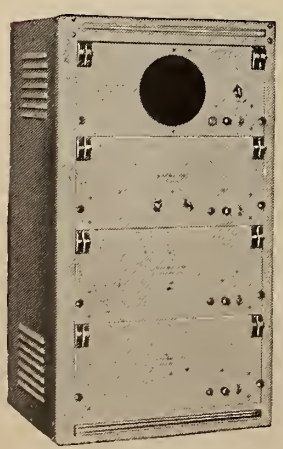
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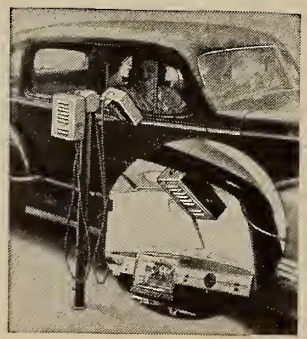
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INTERNATIONAL PROJECTIONIST

VOLUME XXII JULY 1947 NUMBER 7

Screen Illumination Measuring Data

I read with great interest the article on screen illumination in the April issue of I. P.[1] *This Local is purchasing a Weston Model 703 Screen Illumination Meter for checking our theatre screens. Any data you could supply relative to the correct procedure for measuring screen brightness would be greatly appreciated.*—E. P. LEHNHOFF, Local 548, Paris, Texas.

By HENRY B. SELLWOOD

SELF-EXPLANATORY though the accompanying letter be, some comment is warranted relative to this latest manifestation of craft enterprise and pride in good workmanship. Of course, as the only technically-minded person about the theatre, the projectionist should interest himself in the entire projection process—from power source right through to the screen.

But here is an instance—typical of many such—where the Local Union spends its own money and will undoubtedly invest additional time and effort to enhance the appeal of their employers' merchandise—the projected picture image. This undertaking is of a piece with the many hours of study and discussion, often after a night's work, that the craft contributes to the progress of the art. Enlightened self-interest it may be, but it still serves to confound those detractors who characterize projectionists as "button-pushers."

The Weston Model 703 meter was developed at the instigation of the Projection Practice Committee of the S. M. P. E.[2] for the express purpose of measuring screen illumination. Specifications laid down by the Committee required a small, compact, portable and inexpensive light-meter that could be read as easily as an ordinary voltmeter or ammeter.



Weston Model 703 screen illumination meter designed especially for theatre use.

The 703 meter meets all these specs. Compactly constructed and assembled in a sturdy bakelite case, the meter is small enough to be carried in a coat pocket or kept in an ordinary desk drawer.

Details of the 703 Meter

The meter is designed around the so-called Photronic Cell (selenium dry cell) which directly transforms light energy into electrical energy. The electrical energy generated is directly proportional to the intensity of the light striking the cell. The instrument is completely self-contained, permanently calibrated, and requires no other source of electrical energy for its operation.

The cell of the 703 meter is equipped with a Viscor filter which provides visual correction in that it permits only that light which is normally visible to the human eye to be measured. This filter permits the correct measuring of the visual intensity of any lighting source without recourse to reference curves or conversion charts.

This visual correction filter makes possible the accurate evaluation of light sources in terms of human eye response. Tests with this meter calibrated in tungsten light at 3000°K showed that the errors, when measuring low- and high-

[1] "Screen Illumination With Carbon Arc Projection Systems," by R. J. Zavesky, C. J. Gertiser, and W. W. Lozier; I. P. for April, 1947, p. 5.

[2] "Theatre Structure, Screen Light and Revised Projection Room Plans"; I. P. for November, 1938, p. 12.

ASA Screen Brightness Standard

In order to ensure a sufficient screen brightness for proper viewing conditions, the A.S.A. Standard *Z22.39-1944* has specified that "The brightness in the center of a screen for viewing 35-mm motion pictures shall be $10 \pm \frac{4}{1}$ foot-lamberts when the projector is running with no film in the gate."

intensity carbon arc sources, were less than 3 per cent.

The meter reads from 0 to 30 foot-candles. This range is ample for present levels of screen illumination inasmuch as many theatres do not average more than 4 to 8 foot-candles, although the S.M.P.E. recommended average ranges from about 10 to 20 foot-candles with the shutter running.*

Readings at Five Positions

Although the S.M.P.E. Projection Practice Committee recommended that nine readings be taken at various positions on the screen, it is generally agreed that readings at five positions will suffice, as follows: (1) top left corner; (2) at the middle of the left edge; (3) at the center; (4) at the middle of the right edge, and (5) at the bottom right corner. The meter is placed about 1 to 2 feet inside the screen edge in making the edge and corner measurements.

When making a measurement the meter is held flat against the screen, the cell opening facing the projector, with the projector shutter running and no film in the gate. Measure the width and height of the illuminated screen in feet and multiply the two to obtain the area of the screen in square feet.

In order to calculate screen lumens use the following procedure: Multiply the center foot-candle value by 2, then add to this the sum of the readings of the middle of both the left and right edges, and then add the average of the two values at the top left and bottom right corners. Divide the sum of the foregoing by 5 to obtain a weighted average foot-candle value for the entire screen, then multiply this average by the screen area in square feet to obtain screen lumens.

Since the measurement of screen reflectivity and brightness is not as easily accomplished as the determination of illumination, the foot-candle value obtained at the center of the screen should be multiplied by 75 per cent, assuming a matte screen, to obtain the foot-lambert brightness value.

The term "percentage of distribution" refers to the ratio, expressed in per cent, of the average foot-candle readings at the left and the right edges compared with the values obtained at the center. Thus, the readings obtained not only measure the incident light on the screen but also indicate the uniformity of distribution of the light.

A ratio of 80 per cent is considered very good and is obtained by manipulation of the optical system of the projector in a manner familiar to all projectionists.

Factors Affecting Results

In order to compare the screen light intensity in motion picture theatres it is necessary to take into account such factors as projector shutter, heat filters, port glasses, air draft glasses, and screen size. This point was stessed by R. J. Zavesky, of National Carbon Co., in the article previously mentioned.[1] Based on various projection systems, allowance should be made for:

(1) A projector shutter of 50 per cent transmission.

(2) A projection room port glass of 90 per cent transmission.

The values obtained in a particular theatre installation may differ from those reported in tests of similar equipment and carbon setups for numerous reasons, among which are the following:

(1) Difference in the optical characteristics. For example, many of the older lenses are of slower speed than F:2.5.

(2) The possible presence of absorptive factors in the optical train. For instance, shutter transmission may be other than 50 per cent, a heat filter is sometimes employed, a draft glass is often used, and variances with respect to the port glass.

(3) Degree of cleanliness or misalignment of the optical system.

(4) Departure from the specified operating conditions for the arc.

Erwin Geib, of National Carbon Co., reports that the Screen Brightness Committee of the S.M.P.E., of which he is chairman, has been giving this topic considerable thought and the hope is that a report dealing with the subject will be forthcoming within a few months.

* Actually 7 to 14 foot-lamberts.

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

Proving again (if any proof were needed) that a given process evolves as a result of the work of many minds and many hands rather than as a product of "invention" is the appended factual, really historic, summary of the development of the sound film, written by one who for ten years before the commercial introduction of the art was actively associated with the research laboratory which produced the first practical method of recording and reproducing sound on film.

THERE have been various documents published relating to the history of sound recording on film, but they have not been complete, nor have they, in most instances, attempted to rate the relative value of the contribution made by the various inventors. Since I am somewhat in the same position as the famous chemist Berthelot, who was declared to have been the last one who would know the whole of chemistry, I propose to undertake to arrange the technical contributions leading up to the commercialization of sound motion pictures in chronological order, and to attempt this evaluation.

Perhaps I may be forgiven for this apparently egotistical point of view, because I was fortunate to have participated in bringing about the commercial development of sound motion pictures; and for at least a short period of time I was probably the only individual who had heard practically every sound record and knew intimately those engaged in making them.

Late in 1926 I was, like Berthelot, overcome by a feeling of helpless futility: it was then that the art began such rapid expansion that I could no longer keep up with the tremendously increased number of sound records.

In dealing with this development, I shall more particularly restrict my remarks to the photographic methods of sound recording and shall list in considerable detail the steps taken in the development of the Fox-Case system.

Association With T. W. Case

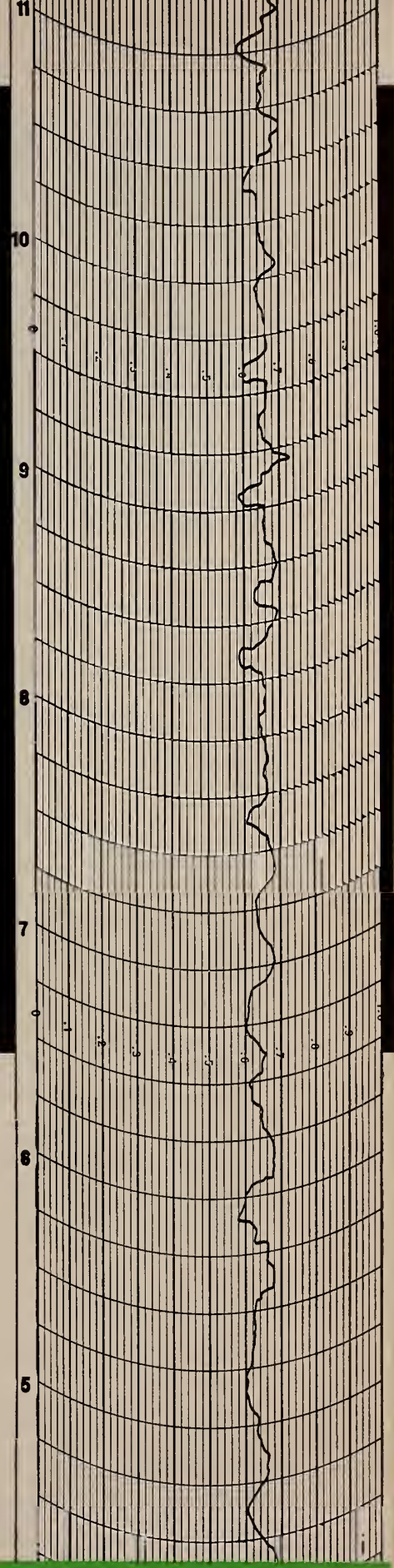
The section of this paper which deals with the work of Theodore W. Case contains abstracts from correspondence which he kindly made available to me, and from the notes of the Case Research Laboratory, which he organized shortly after I joined him in 1916; I therefore know, of my own knowledge, that these notes were kept with a high degree of accuracy and detail, and are correct.

I have quoted directly from these records in some instances, since they are available to the future historian—the original Case Laboratories having been made a museum in the city of Auburn, New York (now known as the Cayuga Museum of History and Art).

The remaining parts of the paper,

† J. Soc. Mot. Pict. Eng., April, 1947, p. 275.





In Front of the 8-Ball

This 8-foot integrating black sphere is called the "8-ball" by technicians in the Strong laboratories.

The inside of the sphere is painted white for perfect reflection and diffusion of the light. Graphic meters record the volume, intensity, stability and color of the light which is projected into it.

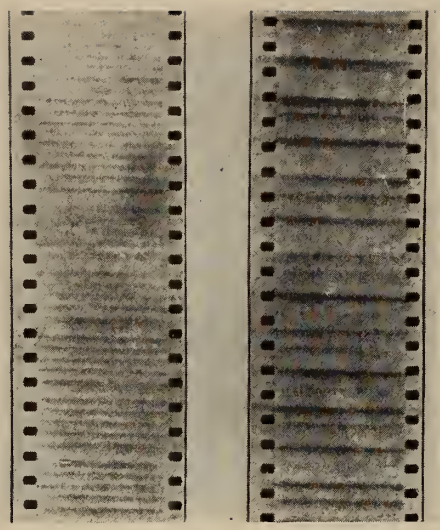
What do these graphs and this research mean to you? Well, just consider that today you are paying 1/17th as much for each unit of light as you were paying twenty years ago.

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Photograph of Ruhmer's sound film.

dealing with the work of others, may have been treated in somewhat less detail: first, because much has already been written regarding their work and it seems unnccessary to repeat it here (except to the extent required for a clear chronological development of the subject); and, second, because I was more directly and intimately concerned with the work of Mr. Case.

To the uninitiated, this account may prove dry reading at best; it is intended to do no more than appeal to those having a substantial interest in, and present knowledge of, the art. If it enables those now devoting their time and energy to the perfection of sound pictures to see something of the stages by which we arrived at our present state, it will have served its purpose.

Early Sound Recording Steps

1857: Leon Scott patented in France what seems to be the first method of recording sound.[1] This disclosure shows the use of a stylus connected to a membrane through a series of levers and a method of tracing figures corresponding to speech, song, *etc.*, on paper covered with lampblack. The paper was attached to a cylindrical drum, which could be rotated by hand and moved forward by a screw. He called the instrument the "phonautograph".

1862: Another example of early interest concerning the nature of sound is found in the work of one Doctor Jan N. Czermak of Vienna, who succeeded in photographing the vocal cords in action.[2]

1877: Thomas Edison brought out his epoch-making invention, the first phonograph. It was similar in principle to the phonautograph but differed in that he used tinfoil on the cylinder and had his stylus attached directly to the vibrating diaphragm. In his later models, wax was used as the recording medium.

1878: Professor E. W. Blake, of Brown University, published a paper on "A Method of Recording Articulate Sounds by Means of Photography".[3] This describes a mirror actuated by a microphone and the moving of a beam of light over a photographic plate.

1880: A. G. Bell patented the method of using selenium for detecting sound signals sent over a modulated light beam.[4] The experiments in light telephony leading up to this patent were carried on in 1879.

Fritts' Remarkable '80 Patent

1880: Charles E. Fritts filed a patent application in the U. S. entitled "Recording and Reproduction of Pulsations or Variations in Sounds and other Phenomena".[5] This application is remarkable in its completeness, broad scope, and length of time in the patent office. As finally granted, on Oct. 31, 1916, it covered 26 pages and had 96 claims.

It is doubtful if Fritts did anything practical; he confined himself to putting down a large number of ideas and variations on paper. Claim *84* of his patent reads "The method of making a sound record which consists in photographically affecting a sensitive surface in accordance with sound waves".

1886: A. G. Bell, C. A. Bell, and S. Tainter patented both a variable-area and variable-density method of recording a sound-modulated light beam through a small slit upon a photographic film.[6]

(*Continued on page* 25)

[1] French patent No. 19,457 (1857).
[2] *Royal Soc. Cat. of Sci. papers, II*, p. 123.
[3] *Amer. Jour. Sci., 16* (1878), p. 54.
[4] U. S. patent No. 235,199.
[5] U. S. patent No. 1,203,190.
[6] U. S. patent No. 341,213.

New 6-Phase McC-C Rectifier for 1 Kw Carbon Arc Lamps

A new 6-phase, full-wave rectifier for 1 kw carbon arc lamps, first of its kind, is now available from McColpin-Christie Corp., which was the first to introduce six-phase rectifiers to the motion picture industry. Designated their type MH28-45, this new rectifier also employs the rugged magnesium-copper sulphide rectifier stack.

The manufacturer explains it this way: a six-phase, full-wave rectifier circuit develops 720 impulses per second. The shutter runs at a rate of 48 r.p.s. and has two blades, thus the shutter frequency is 96. The "beat" frequency produced on the screen, therefore, is 720 minus 96, or 624 cycles, which is indiscernible by the eye on the screen with or without a picture. This is in contrast to the conventional three-phase, full-wave rectifiers which produce 360 impulses, resulting in a "beat" frequency of only 264, or single-phase, full-wave rectifiers which produce 120 impulses, giving a "beat" frequency of 34.

The rating of this new rectifier is 27-30 volts at 45 amperes continuous. 100% momentary overload capacity is built into the rectifier to operate two arcs simultaneously for changeover periods in an emergency. This unit operates on standard three-phase 208/230 volts, 50 or 60 cycles; it can be furnished for 460 volts or other odd voltages. It is also available for 25-cycle supply.

Exclusive Mc-C Operating Features

With the recommended installation of one rectifier for each lamp, uninterrupted service is assured by a simple method provided for quick changeover from one rectifier to the other in the event of an emergency. This is accomplished by incorporating the manufacturer's Type D transfer plug assembly which consists of two parallel 2-pole receptacles in the back of each rectifier. One receptacle accommodates the d. c. lamp plug, the other receptacle is closed by a "dummy plug" which is readily removed in case of an emergency and replaced by the d. c. plug from the other lamp.

Each rectifier is furnished with a high grade moving-coil type d. c. voltmeter. A manual "on" and "off" switch is provided on the front panel. For remote control operation a standard relay and toggle switch is available.

The output of the rectifier is controlled by an easily accessible rotary tap switch mounted on the front of the rectifier. When originally installed and properly set, it rarely needs to be changed. This unit is so compact that it can be conveniently mounted under the lamp. The cooling system is practically noiseless.

More complete information regarding the rectifier is available from Dept. E, McColpin-Christie at 4922 So. Figueroa St., Los Angeles 37, Calif. These rectifiers are now available through all National Theatre Supply branches. Persons outside the United States may contact the factory direct.



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RCA's Novel Periscope Projection Setup

By EDWARD STANKO

Manager, Technical Section, RCA Theatre Service Division

Periscopic projection, so-called, is not new and no attempt is made in the appended article to imply "invention". However, the combination of proper thinking, persistence and the ability to improvise will always command a premium. Once again it is demonstrated that there is no substitute for the ability which stems from long experience and a thorough knowledge of one's craft. Nice goin', Projectionist Charley Kellner.

GUESTS participating in the recent formal opening of the new ultra-modern RCA film recording studios found a member of most interesting features, and particularly those visitors with a technical bent. Of the latter group none was more avidly interested than the representative of I. P., for he found that the addition of a second smaller studio to the main unit contained an ingenious and unusual motion picture projection system.

This article is contributed in the hope that it may satisfy the extreme curiosity of the aforementioned man from I. P. and, by so doing, also enlighten those otherwise highly enlightened projectionists whom he serves so well through these pages each month.

These film recording studios are used for the March of Time, Universal News Reel, Universal shorts and Paramount Famous Cartoons. They are used also by producers of industrial films who find their facilities very convenient for making original recordings as well as for special re-recording work. Film licensees also frequently use the studios when they have a complex re-recording job that requires additional personnel and equipment.

In general, the larger studio is reserved for scoring and dubbing work; while the smaller one is used mainly for production work that involves only the recording of commentary.

The need for additional facilities became acute when M-G-M International decided to employ them in the preparation of films for export in which foreign voice tracks must be substituted for the original English tracks. To provide the proper technical equipment and setting for the commentator whose voice was to be recorded, it was necessary to add a second studio. This, as it developed, required a projection room of special design.



Charlie Kellner, RCA projection chief, showing W. F. Hardman, N. Y. service manager, his periscopic projection setup.

Under normal circumstances, the design of such a studio and its associated projection room would not have presented any great problem. In this case, however, there was one obstacle that at first stumped the experts. Although the building's ceiling height would have permitted elevating the projection room floor to get overhead clearance for the projection light beam, the engineers found that the building structure is such that it is inadvisable to increase appreciably the floor loading at this point.

Since a second heavy concrete floor, together with the projection equipment that had to be accommodated, would have carried the loading past the safe point, all plans for elevating the room's floor had to be abandoned.

In view of this situation, it was decided that the projector would have to be set directly on the regular floor, and that a set of mirrors would have to be used to elevate the light beam enough to clear the heads of the audience in the studio and any people passing in the corridor between the projection room and studio. When this method of projection was first discussed, it was openly condemned by some as a trick system that would not be satisfactory in practice.

Projectionist Kellner Fixes It

It remained for Charley Kellner, longtime Chief Projectionist of these studios, to reduce this periscopic idea to a practical basis. Two mirrors are used in the layout he devised. The lower one directs the picture light beam upward to a height which provides ample clearance for the corridor and studio. The top mirror redirects the light beam through the projection port to the studio's screen.

The mirrors themselves are optical flats with front reflecting surfaces. Such front-surface mirrors are vitally necessary for the projection of an undistorted picture. This is because the spurious reflections from the front air-glass interfaces of the ordinary rear-surface mirrors would be strong enough to noticeably mar the projected picture.

The degree of perfection achieved by projectionist Kellner's setup is remarkable when it is considered that the picture beam, after leaving the projection lens passes through a glass porthole window, an air space between the projection room and the studio, then through the glass window of the studio onto the motion picture screen.

The interiors of both projection rooms are acoustically treated to reduce reverberation and prevent sound leakage into the studio. Thick walls and heavy plate glass windows also help complete the acoustic isolation of the rooms from the studios. Both of the studios are acoustically treated in accordance with latest techniques. Controlled liveness has been retained by special acoustical design and treatment which includes curved sidewall and ceiling splays in the case of the large studio.

The studios and their furnishings comply with all fire control regulations. The decorative drapes are made principally from fibre glass. Whenever other textile materials are used, they have been made flameproof and fire-resistant by special treatment.

Each projection room is equipped with an RCA Brenkert projector, arc lamp and base, and an RCA soundhead with a special preview attachment. The amplifier for the reproducing system of the larger studio is a standard PG-140 equipment. For the smaller studio, its re-recording and monitor amplifier systems are used for film reproduction. A regular theatre type two-way loudspeaker system is employed in the larger studio. The smaller studio employs an RCA film recording monitor as its loudspeaker.

RCA 16-mm sound projectors can be employed in either studio for screening pictures. In the case of the smaller studio, the projector is located in the recording machine room, and the picture is projected through a long observation port located in the wall separating it from the studio. For 16-mm screenings in the larger studio, the projector may be placed either in the studio itself or in the control room at its rear.





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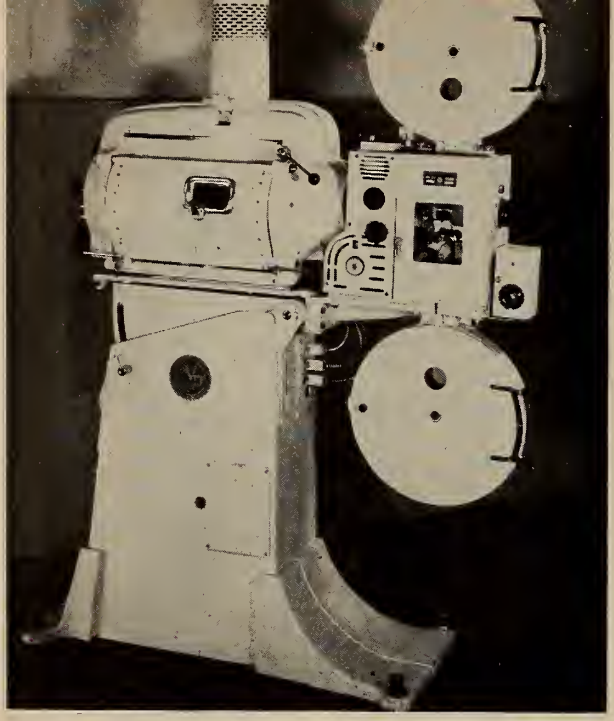


FIG. 1. The new DeVry '12000' 35-mm projector complete, as viewed from the operating side.

Visual components of this new equipment are detailed herein. The sound system will be described in our next issue.

THE DEVRY '12000' SERIES 35-MM SOUND-FILM PROJECTION EQUIPMENT

E. W. D'ARCY
Chief Engineer, DeVry Corporation

THE DeVry "12000" series of 35-mm motion picture projection equipment includes a new design of projector head, new designs of projector base, amplifiers in various powers up to 250 watts, and speakers designed to accommodate theatres of maximum size and ranging down to the drive-in theatre speaker for use within a car.

The projector mechanism head incorporates the sound head components usually supplied in a separate unit. This basic construction allows for great economy and maximum simplification of the mechanical drive for all of the projector functions.

The projector head itself is aligned and secured to a mounting plate in such a manner as to permit rapid replacement in correct projection alignment in case of need, and the switchover from defective head to replacement head can be accomplished very rapidly.

The basic components utilized in the mechanism construction are protected against corrosion or rust by suitable platings or the use of corrosion-resistant material, and assembly of parts to the main mechanism plate is with through-bolting where possible or mechanical locking devices of various approved types.

Basic Mechanism Data

The "12000" projector head is built around a main center mounting plate of normalized aluminum of adequate cross-section to guarantee permanent correct alignment of the optics, sprockets, intermittent mechanism, sound head, *etc.*

All of the power driving mechanism is mounted on the non-operating side of the mechanism main frame and is accessible for service or inspection by a latched, hinged door. Conversely, all of the film handling equipment is mounted on the operating side of the mechanism plate and it, too, is accessible by a latched, hinged door in which a fire-resistant glass port is installed for inspection of the proper operating loops during projection.

The Intermittent Movement

The intermittent movement is of the 90° Geneva cross type, the cam and star operating in an oil chamber. The entire intermittent movement is readily replaceable and is doweled to the framing mechanism so that proper timing may be maintained when removed for inspection, repair or replacement. Lubrication of shaft bearings is by oil canals ground on the shaft, oil feeding from the reservoir. Final end performance of the intermittent is such as to result in a projected picture jump of less than 0.25 per cent at a 100-foot projection distance.

Absolute 100 per cent synchronous framing is accomplished in an ingenious manner, utilizing the chain-drive feature so as to maintain perfect synchronization between the star and cam crossover point and the shutter position. This is accomplished by rotation of the intermittent housing and sprocket around the intermittent sprocket axis through sufficient angle to allow framing over two picture frames.

Synchronization with the shutter is accomplished by synchronizing the rotary movement of the intermittent housing with two vertical moving chain idlers so as to maintain the same effective distance with respect to chain length between the crossover point of the star and the cam and the correct shutter position for 100 per cent synchronous timing. The system is inherently precisely in time at all positions and no vernier timing adjustment is required in order to achieve this 100 per cent synchronization. Fig. 3 illustrates this method.

Film Rails and Shoes

Film rails on which the film rides at the aperture are made of hardened ground stock that is then chrome-plated to reduce frictional resistance, thus allowing the maintenance of adequate tension on the film during projection and insuring a steady projection without undue strain on the film perforations. Edge-guiding flanged rollers are mounted at the top of the film rails and are hardened and of adequate diameter to insure a solid film guide to the correct lateral position. Side sway is also held to less than 0.25 per cent at a 100-foot projection distance.

Film is held securely to the film rails by means of film shoes from a position well above the aperture to the intermittent sprocket. This is accomplished by three pressure shoes, the aperture film

shoe being adjustable in pressure to allow compensation for various conditions of film, and it can be adjusted during projection. The intermittent sprocket pressure shoe holds the film on the intermittent sprocket and guarantees a four-tooth engagement with the sprocket at all times.

Clearances between the individual shoes, as shown in Fig. 4, are of the order of 1/16 inch and this extremely close film contact with the rails guarantees freedom from film slap, thus aiding in the reduction of film jump or weave.

The assembly plate mounting all of the four tension shoes is removable by a single knurled thumb nut for cleaning purposes and is positioned by guide pins to insure correct replacement alignment in the operating condition. All springs used for the gate assembly are tested thoroughly as to tension.

Power and Drive Data

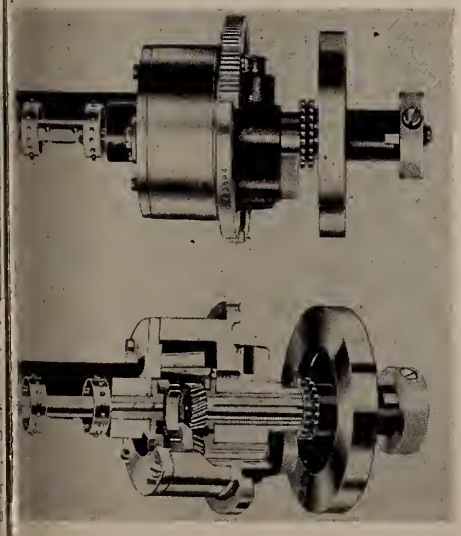
All power is transmitted in the "12000" series of projectors by means of silent chain drives which accomplish a positive mechanical drive system, additionally allowing rapid replacement of worn assemblies without the necessity of skilled mechanical craftsmanship.

The chain drive system, as such, has been field-tested throughout a 15-year period and has certainly proven its dependability and long life in actual operation, more than 10,000 projector mechanisms having been made with this drive system, to the users' complete satisfaction.

The main driving motor normally supplied is a ⅛ h.p. split-phase, self-starting, single-phase induction unit, statically and dynamically balanced, and so adjusted as to starting characteristics that no undue strain is placed on the film or mechanism during acceleration to operating speed. It will function satisfactorily between voltage variations of 110 to 120 volts, and within this range operates with less than ½ per cent variation in the mean speed of the film.

Other special purpose motors are available for the operation of the projector under all field conditions from 25 to 100 cycles. This line of A.C. motors is implemented by governor-controlled types of universal characteristics which guarantee correct performance of the projector over wide voltage variations such as are encountered in poorly regulated power areas, both domestic and foreign. In all cases motors are adjusted as to acceleration characteristics to equal that of the standard motor normally supplied.

FIG. 2. DeVry '12000' intermittent movement.



Barrel-Type Shutter System

The shutter utilized in the "12000" series of projectors is of the barrel type, running at 1440 r.p.m., and is of rugged construction, with its driving shaft extended through a bearing housing to the rear of the mechanism. The film shutter assembly is supported on roller bearings mounted in the bearing housing assembly, silicone high temperature grease being used as a lubricant. The shutter is mounted between the light source and the aperture and is of slightly more than 50 per cent transmission efficiency.

Of course, the inherent advantage of the barrel shutter with reference to double light cutoff is well known with respect to flicker reduction.

The fire shutter assembly is integral with the shutter and functions by means of centrifugally-operated weights with rawhide inserts which transmit power between the film shutter main shaft assembly and the fire shutter shaft. This arrangement works infallibly under all conditions of temperature or oil seepage.

The fire shutter is set to open or close at a film velocity of 50 feet and its roller bearings are silicone grease-sealed type capable of withstanding high temperature operation.

All sprockets are hardened and ground and are in accord with the standard dimensions of the Society of Motion Picture Engineers.

DeVry Projection Lenses

Projection lens focusing is accomplished by a micrometer screw located outside the projector case with the lens focus lock located inside the projector case, assuring permanent, accurate lens focusing. The focusing mount lens holder barrel extends through the projector case so as to allow the clamping of a preset focus ring onto the objective lens, allowing rapid replacement in focus registry when lens removal for cleaning is required.

The projection lens focusing device is screw-driven and slides on a rod of adequate section in a straight line motion, guaranteeing no shift of picture position on the screen during all focusing operations.

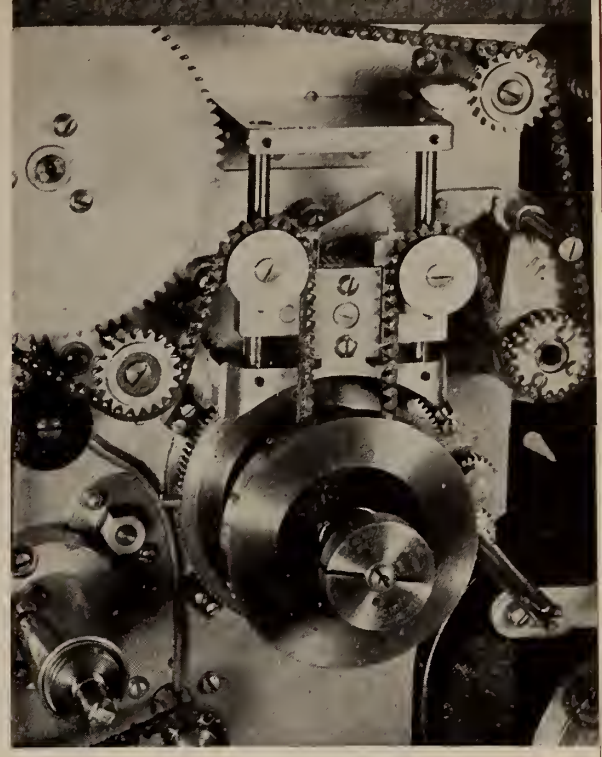


FIG. 3. '12000' drive mechanism.

DeVry projection lenses are supplied in Series II, in all focal lengths from 3½ to 9¼ inches and are coated so as to achieve maximum efficiency in light transmission. The formulae on which these lenses have been designed have been time-tested through many years of experience in the manufacture of high-speed, high-resolution projection lenses. The lenses are free from halo effects, and suitable interior lens barrel blackening, with the addition of coating, guarantees an efficient, high-contrast, sharp picture.

The magazines are made of sheet metal spinnings mounted on cast aluminum support frames in which is mounted the fire trap roller assembly. This assembly is comprised of two floating hardened and ground rollers, gravity-held against a single accurately-positioned main trap roller. Clearances between rollers and film is held to less than 0.005 inch, guaranteeing effective fire trap action.

Feed reel holdback tension is adjustable by means of a knurled tension nut compressing the holdback spring against a washer-type brake clutch assembly.

Takeup power is transmitted through a chain drive from the projector mechanism to the constant-torque clutch assembly, mounted on the takeup spindle shaft. Takeup film tension is of a designed value and is not field-variable. Torque uniformity is such as to accommodate any reel size up to 2,000 feet capacity.

Film magazines and fire traps have been approved by the Underwriters' Laboratories and the various state regulatory agencies.

Projector lubrication is by both oiling

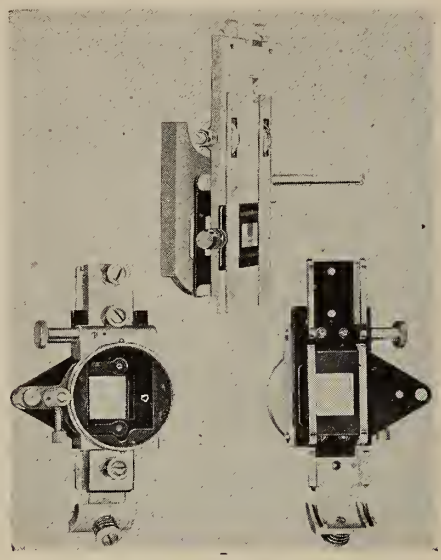


FIG. 4. Rail and shoe assembly.

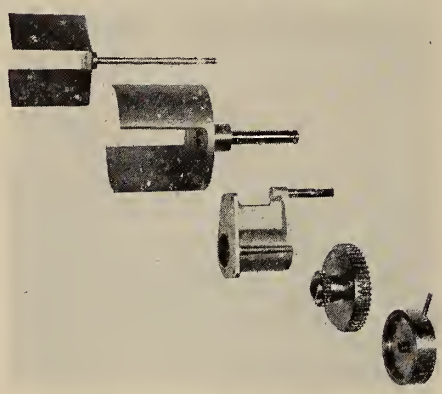


FIG. 5. Fire shutter assembly.

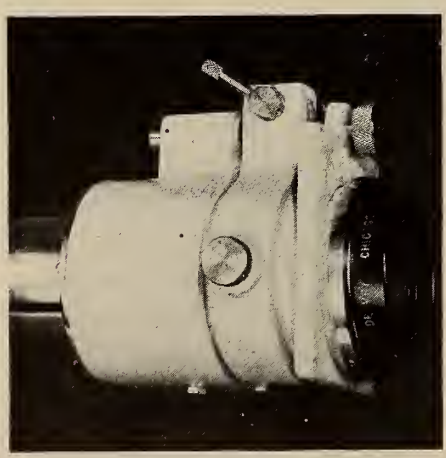


FIG. 6. Lens focusing mount.

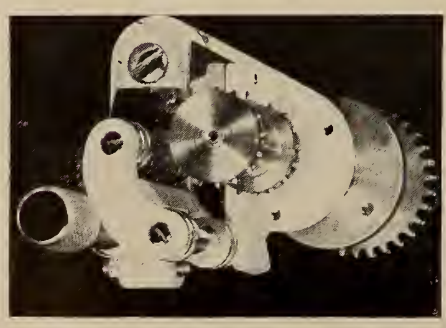


FIG. 7. Sprocket pad roller.

and greasing. A single-point visible oiling system serving the oiling requirements and Alemite fittings are used for the greasing points. The system is of a gravity-feed visible reservoir-type and feeds all bearing assemblies requiring the lighter type of lubrication.

Silicone grease is used in the shutter assembly and this is supplied every 500 hours by means of an Alemite gun.

Sprocket Pad Roller Assembly

The sprocket pad roller assembly is mounted integrally with the sprocket shaft housing assemblies and its operation is that of a lever arm, its final position determined by a spring-motivated plunger pressing into adjustable registry points located on the sprocket shaft housing assembly. The pad rollers themselves are removable, for cleaning or replacement, from the operating side of the projector by the removal of the pad roller operating knob which releases the front pad roller bearing plate.

The pad rollers are made of hardened and ground steel and are set so as to allow ample clearance with the sprocket teeth. The operating means for the pad roller is of adequate size to insure long life and ease of operation.

All projector switching is accomplished in a terminal box located at the top of the mechanism case; these facilities consist of a motor switch, framing light switch and changeover button. This location places all changeover operations within the span of a hand, thus eliminating the spread-out switching method so commonly used, with its attendant operating difficulties.

This method of switching was incorporated at the request of many projectionists who felt that something could be done about eliminating the two-handed-one-foot requirements of the conventional projector changeover operation.

Air Blast Cools Head

An adjunctive ventilation unit is supplied for high-intensity arc operation, acting to cool both the film rails and film to such a degree as to render unnecessary the use of a heat filter and thus permit maximum light on the screen. The temperature of the rails under 80-ampere high-intensity projection conditions is reduced to less than 120° at the end of a 20-minute period of operation.

Ventilation is accomplished by means of a pressure blast of air and an effective means of exhausting same. An air blast is directed across the aperture, film rails and film in such a manner that the film is not disturbed during projection; the heated air is then carried away to a location where the head exhaust fan is effective. This additionally removes heat radiated from not only the aperture rails and baffles, but from the shutter as well.

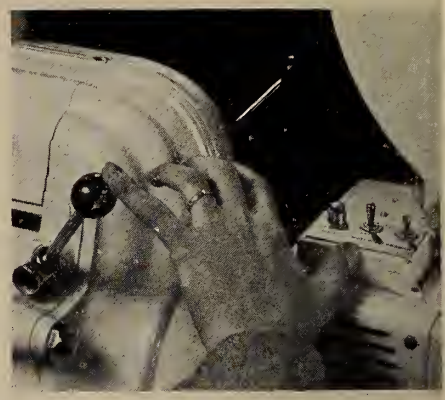


FIG. 8. Centralized finger-tip controls.

Film cooling is quite effective by this means, and a substantial increase in film life is obtained, as compared with conventional methods of film projection.

The head ventilation is supplied as an adjunctive unit, complete in itself and readily attachable to all "12000"" projector heads.

[NOTE: The second and concluding article of this series, describing the sound system of the DeVry "12000" equipment, will appear in the next issue.—ED.]

Superior German Mirrors Are Revealed by U. S. Bureau

Semi-transparent mirrors that absorb only from one to two per cent of the incident light and transmit light without coloring it perceptibly were manufactured in Germany during the war, according to a report now on sale by the U. S. Dept. of Commerce. The report describes visits to the W. C. Heraeus Co. and the Siemens Schuckert Works to obtain data on German vacuum evaporation methods for producing first-surface mirrors, semi-transparent mirrors, and non-reflecting films.

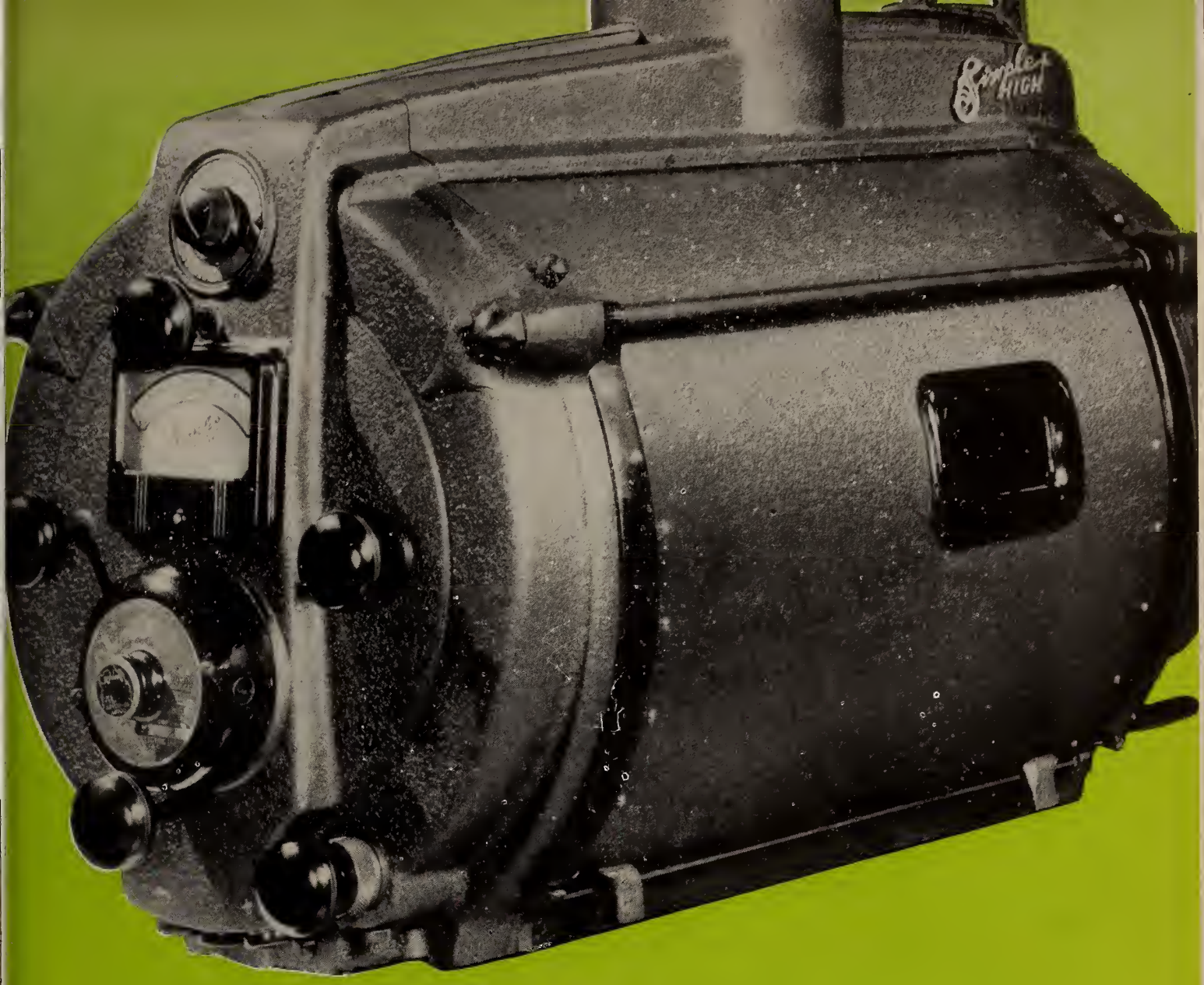
Heraeus manufactured first-surface mirrors that were resistant to water and abrasion and did not corrode in air. The "Steinheil-2"-type mirrors, consisting of a film of titanium dioxide on a glass base, had a coefficient of light absorption of about one per cent. The maximum reflectivity attainable in these mirrors reached 42 per cent. Light passing through them acquired a barely perceptible pink tint.

Used Vacuum Evaporation Process

The Heraeus company used vacuum evaporation methods that produced first-surface rhodium-coated mirrors capable of reflecting 10 to 13 per cent more light than similar mirrors made in the U. S. by electrolytic deposition. The Heraeus mirrors had a maximum reflectivity of 85 per cent; the American mirrors, 72 to 75 per cent. The report attributed the superiority of the German mirrors to the fact that vaporized or gaseous rhodium is purer than electrolytic rhodium.

The report contains two special appendixes: one describing the work instructions for producing thin mirror coatings according to the Steinheil processes; and the other, the vacuum evaporation method developed by Siemens Schuckert Works and used by Heraeus.

Address orders for report (PB-4158, "German Vacuum Evaporation Methods") to O. T. S., U. S. Dept. of Commerce, Washington 25, D. C. Cost is: for photostat, $3; microfilm, 50 cents; paper, 43 pages including illustrations, $1.50, with checks payable to Treasurer of the U. S.



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AT YOUR SERVICE

This department is devoted to the man behind the man behind the gun—the serviceman. Its prime purpose is to promote a closer relationship between projectionist and serviceman based on a better understanding of their mutual problems through an exchange of news and views, kinks and kicks. Contributions from both groups are invited.

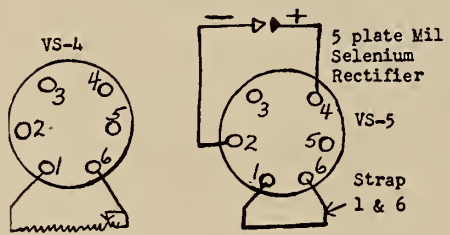
Excessive Plate Current in the MI-4256 Amplifier

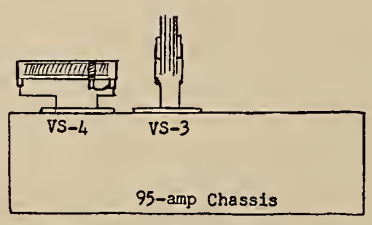
On an RCA system the plate current values of the 83 rectifier and 2-A3 tubes in the MI-4256 amplifier were found to be approximately three times their normal values. A checkup of the 80 bias rectifier circuit showed its output was below limits and the C46 30-mfd. condenser open. Bias on the 2-A3 tubes was only 30 volts, as compared with a normal value of 62 volts.

Replacement of the C46 raised the voltage output of the bias rectifier and reduced plate currents of the 2-A3 amplifier and 83 rectifier tubes to normal.—H. J. Nelson, *ALTEC*.

Substitution of Selenium Rectifier for 25Z5 in the 95 Amplifier

Here is a suggestion regarding the replacement of the 25Z5 vacuum tubes in





the 95 amplifier with a selenium rectifier. I believe the drawings given here are self-explanatory.—C. W. Scott, *ALTEC*.

Hum May Cause Cross-Modulation

It should be remembered that 25- or 60-cycle hum can produce a "raspy," "fuzzy" modulation of the 1500-to-5000 cycle band that sounds the same as "flutter" and can easily be confused with sprocket-hole noise modulation.—Fred Manley, *ALTEC*.

Non-Magnetic Screwdriver for P.M. Speaker Diaphragm Replacement

To reduce the possibility of damage to the diaphragm during replacement on a p. m. speaker, I have had constructed a non-magnetic screwdriver of 18-8 stainless steel. I believe that phosphor-bronze of sufficient hardness for the tool is available.—J. B. Pesek, *ALTEC*.

Oil Leakage on 712 and 719 Drives

About two years ago I started adding water-pump grease to our (Altec) AP-1033 grease, in the proportion of about one-to-one. This corrected all cases of excessive leakage. Our angle on the water-pump grease is that it does not break down or mix with the other grease, thus being carried to the point of leakage where it forms an effective seal.—G. E. Wiltse, *ALTEC*.

Conserving E-7 Framing Lamps

If an excessive number of such lamps are used, remove the lamp assembly and check to see if the lamp is striking the metal case when the plunger P-641-D is released. When this happens several times, the filament breaks and the lamp is prematurely rendered inoperative.

To correct this, remove shaft S-1367-D and slide out the plunger P-641-D far enough to permit insertion of a washer, preferably fibre, around the plunger. This will eliminate case-bumping and cushion the entire assembly.—M. MacMillan, *ALTEC*.

Insulator for Negative Carbon Holder on the Peerless L. I. Lamp

In an emergency when the negative carbon holder on a Peerless 1.-i. lamp breaks and "shorts", a temporary insulator can be rigged as follows: get a 60-amp cartridge fuse and saw off the metal ends. Saw a slot lengthwise through one side. The tube may now be slipped on the negative holder with the slotted side away from the locking screw, and the lamp operated in a normal manner. I have used one of these insulators for several days with no sign of charring.—M. MacMillan, *ALTEC*.

Flutter Reduction on Universal Base

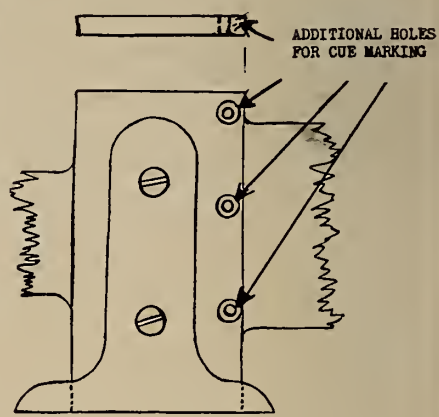
Have made attempts over a period of six months to eliminate the periodic appearance of 96-cycle flutter on a pair of Universal Bases. Adjustment of the shoe tension springs, removal of the roller on the film chute, and all other conventional adjustments served only temporarily.

It was observed that the P-2284 pad rollers had worn in such a way that they resembled wheels on a box car, only the flanges were on the outside instead of the inside. This condition, along with other irregularities due to wear, caused the film at times to ride on the edge of the teeth and cause flutter.

Replacement of these rollers permanently cleared the trouble; and it didn't make much difference whether the projectionist used a large or a small loop.—L. R. Davies, *ALTEC*.

Griswold Splicer as Cue Marker

Eddie Howson, Lyric Theatre, Watertown, S. Dakota, is using the accompanying modification for cue-marking film. Holes for film cue marks shown on Gris-



wold Model R-2. Spacing of holes to be determined for individual splice block. A 3/32" hole to be drilled through hinged casting, countersunk nearly through with 3/16" or 7/32" drill. This will allow easier use of scriber when affixing cue marks.—Walter Wicks, *ALTEC*.

Extending Tungar Bulb Life

The short life of tungar bulbs used in arc rectifiers of several theatres led to the following:

A DP switch was installed in the D.C. arc lamp circuit, in addition to the A.C. switch controlling the primary current of the rectifier transformer. When the lamp is shut down, the A.C. switch is first opened, then the D.C. switch is opened and the A.C. switch again closed, thus keeping the filament hot.

When the arc is again struck the load is applied to a hot filament, resulting in longer bulb life. Actual records cover-



Brush aside that lack-luster veil... use

HIGH INTENSITY PROJECTION

FOR the added cost of one or two admissions per day, you can make every black-and-white picture sparkle with detail . . . give rich, brilliant overtones to your color pictures . . . and *bring more people to your box office!*

You do it with High Intensity Projection.

For example, One-Kilowatt High Intensity Projection provides a 50-100 per cent brighter screen. It makes available to the small theatre the same impressive visibility and fidelity of color found on the screens of the largest big-city theatres. This means more pleasure for your audiences . . . and a consistently bigger box office!

. . .

Take advantage of the profits to be had from High Intensity Projection. Consult your supply house immediately on the availability of High Intensity lamps.

NATIONAL CARBON COMPANY, INC.

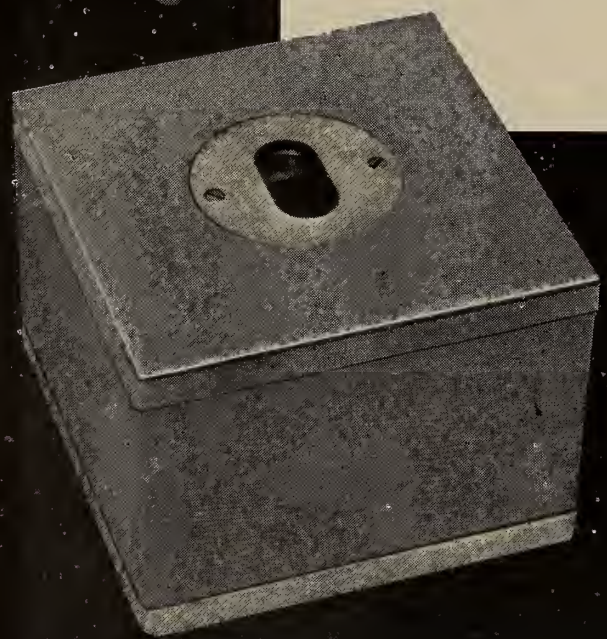
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Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

For the *best* in motion picture sound...



the new *Western Electric* magnetically sealed light valve

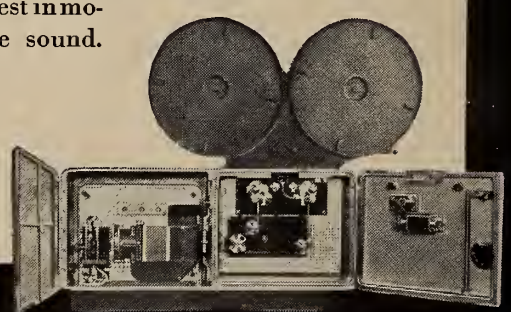
Magnetically sealed light valves are an outstanding feature of the new line of Western Electric recording equipment.

These new type valves, a triumph of precision in design and manufacture, are nevertheless small and rugged, and provide the highest degree of recording efficiency ever achieved.

Magnetic sealing keeps dust and foreign material out permanently. And you get *stable* operating characteristics regardless of temperature changes, for the various materials in the valve have compensating coefficients of expansion.

Other advantages are improved optics and better damping of the ribbons, which reduces the resonant peak to small proportions.

The magnetically sealed valve is one of numerous reasons why Western Electric means the best in motion picture sound.



The Western Electric 400 Series leads a new line of sound recording equipment. Records standard or 200 mil push-pull track.

Electrical Research Products Division
OF
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Hollywood Office—6601 Romaine Street

New Acetate Color Film Releases Induce Varying Opinion Anent Quality

REVELATION by I. P. of the intention of film manufacturers to gradually supplant the nitrate motion picture film now generally used throughout the industry with acetate stock induced great gobs of craft comment from every section of the country. Surprisingly, a great majority of projectionists had had no previous intimation of the introduction of acetate film, and several learned for the first time that they had run acetate prints without being aware of so doing.

Almost all acetate stock is now confined to release prints utilizing the Magnacolor, Cinecolor or Trucolor processes, with the bulk of such prints being of the latter type distributed by Republic Pictures Corp.

Comments from the field indicate that the new acetate prints are not wholly satisfactory. The difficulty of splicing this stock is the chief operating problem, but there are many projectionists who insist that these two-emulsion prints make it impossible to effect a sharply focused screen image, while others assert that acetate prints are much less pliable than nitrate and exhibit a pronounced tendency to become brittle.

Representative Craft Comment

Representative comment from projectionists in various sections of the country who have run these acetate prints is offered in the "Letters to the Editor" section elsewhere on this page.

Film manufacturers and suppliers of cement confess to an inability to understand why there should be any difficulty experienced in splicing acetate film. About 16 months ago Eastman Kodak Co., preparatory to releasing a greater quantity of acetate stock for general release print use, worked out a formula for the so-called "All-Purpose" cement which was sent to all manufacturers of film binding agents. Eastman itself supplies such a cement, as do certain other agencies, notably Rosco Laboratories, of Brooklyn, N. Y. These suppliers insist that the "All-Purpose" cement should and does do an efficient splicing job.

In support of these contentions it is pointed out that in the amateur film acetate film has been spliced without the slightest trouble over a period of many years. Projectionists are quick to stress the fact, however, that this amateur stock is *not* two-emulsion film, as are the color release prints supplied to theatres.

A survey made by I. P. of leading theatre circuits throughout the U. S. revealed that little difficulty has been experienced in effecting an acetate splice that will hold equally as well as a nitrate splice. Some difficulty was experienced at the start, it was admitted, but projectionists generally seem to have mastered the knack of making a strong acetate join.

Splicing Difficulties Cited

One I. P. correspondent—R. A. Young, of Homestead, Fla.—insists most emphatically that the "All-Purpose" cement will *not* hold a splice on acetate film even as well as the "Regular" cement which was intended primarily for nitrate stock. A conscientious worker, Young relates how he was very careful to scrape *both* sides of the film and to hold the film in the splicer longer than usual: but the splices still came apart during projection.

Another projectionist in Penna. tells how he did not become aware that he was working with acetate film until after several futile efforts to splice the stock. Fortunately, he happened to have on hand in his projection room some home-movie cement, and thus was able to put a picture on the screen.

These typical incidents point up a rather general feeling among projectionists that the introduction of these new acetate color prints was not handled efficiently by either the film manufacturer or the exchanges, with Republic the chief offender among the latter group. Eastman did evolve the acetate cement formula and did notify all suppliers of its exact composition. Obviously, Eastman could not send a fieldman into every community where an acetate print was to be run, and the presence of acetate edge-markings on practically every foot of a release print is held to constitute ample warning to projectionists.

The chief deficiency seems to lie with the Republic exchanges. Since their prints constitute by far the greater portion of acetate stock in use, extreme care should have been taken to see that a sufficiently eye-arresting notice was enclosed with every acetate shipment to

(*Continued on page* 33)

LETTERS TO THE EDITOR

To the Editor of I. P.:

I had occasion, only three days before reading the fine article on acetate film in I. P. for June, to handle an acetate print: Republic's Trucolor "Out California Way."

When I started to inspect this print I was not aware that it was an acetate print; but it didn't take me long to find it out. I had no sooner started to rewind when the film came apart where it had been spliced with nitrate cement. I tried splicing it twice with nitrate cement, without success, before it occurred to me to check the edge of the film. I discovered that it was acetate stock. I then made splices with some Eastman Safety Cement that I happened to have on hand and which I use on my own home movie film.

Now, just what would have happened if I had not had this cement on hand? No show? It seems to me that the introduction of these acetate prints has been very badly handled, from Eastman down through the exchanges.

Altogether I found about a dozen defective splices through the one print which had been made with nitrate cement. In general the print was in very poor condition.

I don't know whether Trucolor is the same as Cinecolor, but it seems to me that this type of color doesn't work out well on acetate stock. The color is quite fuzzy compared with the sharp reproduction possible with Cinecolor *nitrate* prints released by Monogram and others.

Technicolor seems to work out quite well on safety film, because I have seen such 16-mm stock that is as sharp and crisp as any nitrate print.

HOWARD C. BENSON.
York County, Penna.

To the Editor of I. P.:

I have used the three types of film—Trucolor, Magnacolor, and Cinecolor—mentioned in your article on acetate film, with fairly good results. The biggest

(*Continued on page* 32)

IN THE SPOTLIGHT



By *HARRY SHERMAN*

EPHIM BORTNICK, member of New York Local 306, proposed many excellent ideas during the past years, several of which were at first laughed at by the membership and then later adopted. His chief handicap in presenting his proposals lay in his foreign accent; his ideas were sound. We remember when many years ago he suggested a work-week of six days, he was severely ridiculed. But Bortnick was persistent and after much wrangling the Local followed through and the six-day week was incorporated in all Local 306 contracts. From time to time he made other proposals, which at first seemed revolutionary in show business but were later adopted.

At a recent meeting, Bortnick made what may at first seem to be a rather startling proposal, but upon reflection appears sound and feasible. He suggested that film exchanges, in appreciation of services rendered by projectionists in taking care of and in patching broken film delivered to the theatres, be invited to contribute to a welfare fund for old and sick projectionists. This contribution can take the form of a levy of a few cents per week on each container of film delivered. This small donation would hardly be felt by the exchanges and it would be returned to them many times over in the form of *extra special* care taken in handling film.

It would be small recompense for the torn and broken finger nails and bruised hands almost every projectionist has suffered in opening broken and damaged film containers, and for the many other little services given which are not part of his regular duties. In many instances, projectionists spend considerable time after the show closes in trying to replace the reels in the broken carriers without further injury to the film. Damaged film caused by broken containers is the responsibility of the exchanges and not of projectionists; and if our men take special pains to prevent this condition their efforts should be rewarded.

We think Bortnick has something here. We should like to get the reaction of our readers to this proposal.

"Pappy" Luther, Dallas Local 249 and "Bumps" Coogler, Houston Local 279 in a fistic pose.



• Chickens always come home to roost. Incensed over the passage of the Taft-Hartley Labor Bill, the executive council of the New York State Federation of Labor in a closed meeting accused N. Y. Senator Irving M. Ives of "betraying labor." We wonder if Tom Murray, president of the N. Y. State Federation of Labor, remembers the Federation's endorsement of Senator Ives at the last election; or is he trying to forget his "boner"?

• Thirty-five I. A. Locals in Western Pennsylvania, Eastern Ohio, and West Virginia, members of the Tri-State Association, held their 23rd annual meeting last month and elected F. P. McCoy treasurer of the Association. McCoy is also secretary of New Kensington-Tarentum Local 444 and his experience as a Local official should stand him in good stead when dealing with the many problems confronting labor organizations.

• Carroll Bayne, business agent of Baltimore Local 181, was appointed by Maryland's Governor Preston Lane to serve on the motion picture projectionists licensing examining board.

• Charles Hathaway, business agent for Local 513, Tulsa, Okla., and I. A. representative, was elected secretary for the 15th District, succeeding Jess Bollman.

• A tip to the officers of the 25-30 Club: George Raaflaub, secretary of Syracuse Local 376, became eligible for membership in the Club on June 1 last when he celebrated his 25th year as a member of his Local. Although not a member himself, George was instrumental in obtaining 25-30 Club memberships for qualified Local 376 men.

• Allen J. Tindall, president of Rochester Local 253, was recently appointed Grand Senior Steward of the Grand Lodge of Masons of New York, and may now be addressed as "Right Worshipful Sir." Tindall has been very active in Masonic circles for quite some time, being a Past Master of Orpheus Lodge and its present secretary.

• As a veteran of World War I, Charles Sherman, member of New York Local 306 and projectionist at the Roxy Theatre, has devoted much of his time to promoting the activities of the American Legion, the Veterans of Foreign Wars and Jewish War Veterans. Charlie recently organized a new Post in honor of Peter G. Lehman, son of the former governor of New York who made the supreme sacrifice in World War II. The colors will be presented to the Peter Lehman Post at a public installation to be held next month at the 8th Regiment Armory in New York City.

• I. A. President Walsh, now in London conferring with British film labor leaders, is leaving for the U. S. on the Mauretania July 23 and will arrive in New York on the 29th.

• George J. Schaffer, business agent of Los Angeles Local 150, is busily engaged these days in negotiating new contracts. Although he is confronted with some pretty tough situations, we wager he will come out on top. George has tackled and licked many a tough problem in his day, and meeting with exhibitors in contract negotiations is duck

soup to him. Wallace Crowley, Charlie Vencill, Don Gallant and George Evans are members of the wage scale committee.

• We were shocked to learn of the sudden death of Joe Fitterman, treasurer of the 25-30 Club. Joe, who was a member of New York Local 306, was stricken with a heart attack while working in the Paramount preview projection room and died several hours later. He had been a widower for many years and remarried about five months ago. He is survived by a widow and several children and grandchildren.

• A visit backstage and to the projection rooms of Radio City Music Hall seems to be the goal of almost every out-of-town I. A. man hitting New York. Charlie Mueller, chief projectionist at the Music Hall, has earned the gratitude of scores of these men for his unfailing kindness and patience in showing them through the intricacies of the Hall's amazing behind-the-scenes workshops. He is very proud of the efficiency of his staff and of the projection setup of this world-renowned establishment. And rightly so.

• Jack Behlke, member of Chicago Local 110 and a Motiograph representative, visited the offices of I. P. during a recent trip East. His trip here was primarily to inspect various Motiograph installations.

• The number of minors under 18 found to be employed in violation of the child labor provisions of the Fair Labor Standards Act jumped 15 per cent during the last six months of 1946, compared with the last six months of 1945, this despite a reduction of more than 50 per cent in the total minors employed in inspected establishments. The law's child-labor provisions set a basic minimum age of 16 years for general employment and 18 years for occupations covered by hazardous occupations.

Of the 20,294 minors in establish-

(*Continued on page* 29)

Dallas Local 249 Presents Gold Card to Harry Sherman



L. 249 OFFICIALS, I. A. REPS., AND RECIPIENTS AT GOLD CARD PRESENTATIONS

Front Row (l. to r.): John Hardin, Paul Humphries, Charles Harcum, Local 249; Harry Sherman; Louise Wright, 9th I. A. vice-pres.; Phil Isley; G. L. Luther (bus. agt.), Randall Estes, Jack Hill, L. 249. Back row (l. to r.): Thomas Shea, I. A. ass't. pres.; Harvey Hill, Sr., Earl Holt, pres., L. 249, and Eddie Miller, I. A. rep.

TALL doings in typical Texas fashion transpired at the headquarters of Dallas Local 249 the evening of June 30. Occasion for the soiree was the presentation of gold honorary life membership cards in Local 249 to Harry Sherman, of I. P.. and Philip Isley, charter member of the Local and now the owner of a theatre circuit, who has always been very cooperative with the unions.

Isley, incidentally, is the father of Jennifer Jones, outstanding screen star whose current opus is "Duel in the Sun".

Presentation of the cards was made by Earl A. Holt, president of Local 249, while G. L. (Pappy) Luther, business agent, and Harvey Hill, Sr., were in charge of arrangements for the affair, assisted by Harvey Hill, Jr., financial secretary, and W. R. Estes, corresponding secretary. Local 249 sponsored the party, but all Dallas I. A. locals participated, including 803 (wardrobe); 127, B-53 and F-53.

Representing the General Office of the I. A. were Tommy Shea, assistant president; Louise Wright, 9th vice-president, and Eddie Miller, I. A. representative and business agent of Houston Local 279. Other Texas local representatives at the party were:

Houston Local 279: Charles Smith, president; Walter Kunze, secretary; F. (Bumps) Coogler, Jess Hogue and Woodrow W. Wilson. Wichita Falls Local 378: J. Max Ealy, business agent and secretary. San Antonio Local 407: John Dennis, business agent, and William Keeler. Fort Worth Local 330: Henry Wood. Austin Local 205: E. P. Ischy, Business Agent. Lufkin Local 360:

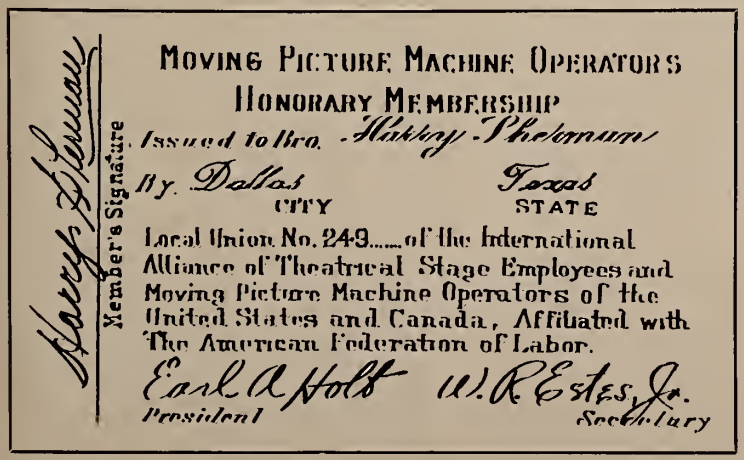


Earl Holt presents gold card to Sherman.

Alton P. Garrard, secretary. Marlin-Hearne Local 692: B. L. Lenoir, business agent and secretary.

From London, where he is currently engaged in conferences with British film labor leaders, I. A. President Richard F. Walsh sent the following cable:

"Have learned of Local 249's action in awarding Harry Sherman gold honorary membership card for past services rendered. It was a nice gesture on part of Local to remember those services by such appropriate action."



MOVING PICTURE MACHINE OPERATORS
HONORARY MEMBERSHIP

Issued to Bro. Harry Sherman

By Dallas CITY Texas STATE

Local Union No. 249 of the International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators of the United States and Canada, Affiliated with The American Federation of Labor.

Harry Sherman Member's Signature

Earl A. Holt President W. R. Estes, Jr. Secretary

Facsimile of gold honorary life membership card tendered Harry Sherman by Dallas Local 249.

Complete Projection Data Charts

By ROBERT ALLEN MITCHELL

The fourth in a series of seven articles providing data forms which, when filled-out to a reasonable degree of completeness, afford a comprehensive and accurate description of an individual installation.

IV (A) Sound System Data

THIS fourth installment was originally intended to cover the entire sound reproducing apparatus, including an auxiliary equipment section which adds greatly to the utility of these sheets. However, limitations of space prevented the inclusion in one issue of all the relevant forms, thus Form 4 will be presented in successive issues with identifying alphabetical designations—A, B, *etc.*

These forms should be filled out in pencil, *not* in ink, since changes may be desirable at a later date. Enter the most obvious and easily ascertained facts first, then go after the details. Nor need these forms be filled out down to the very last detail, since even a few salient items may prove of great service to the projectionist in an emergency or when alterations to the system are made.

Only a competent projectionist thoroughly trained in sound reproduction can hope to analyze an amplifier with any great degree of success. An untrained man, unfamiliar with testing methods, may do harm to the equipment. In those theatres receiving sound service, the sound engineer should be consulted before testing amplifier circuits. His advice is always helpful.

The first and most important step is to obtain amplifier wiring diagrams. Most manufacturers will gladly supply these sheets at cost. Much information may be obtained from a study of the diagrams, and before any testing is done the circuits should be traced through.

FORM 4: SOUND SYSTEM DATA

Theatre _____
City _____
State _____
Theatre Circuit _____

Date _____
Revised _____

Chief Projectionist

1. POWER SUPPLY

AMPLIFIERS

Rectifier Units:
Type _____
Make & Model _____
Number of Units _____
Serial Nos. _____
Input A. C. voltage _____
Output voltages _____
Capacity, watts _____

If Tube Rectifier:
Number of Tubes _____
Type No. tubes _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____
Specifications of filter apparatus
_____
_____
Where located _____

Batteries:
"A" batteries—type _____
_____
Number of batteries _____
Total output, volts _____
"B" batteries—type _____
_____
Number of batteries _____
Total output, volts _____
"C" batteries—type _____
_____
Number of batteries _____
Total output, volts _____

Battery Chargers:
Type _____
Make & Model _____
Number of chargers _____
Serial Nos. _____
_____

If Tungar Type:
Number of tubes _____
Type No. tubes _____
Input A. C. voltage _____
Output voltage _____
Charge which batteries _____
_____
Where located _____

Motor Generators:
Make & model _____
Number of sets _____
Serial Nos. _____

Motors:
Serial Nos. _____
H. P. _____
Volts _____
Cycles _____
Phase _____
Speed _____

Generators:
Number per motor _____
Serial Nos. _____
Output voltages _____
Capacity, watts _____
Filter apparatus _____
_____
Where located _____
Power supply for amplifiers, remarks
_____
_____

Exciting Lamps (If exciter power is drawn from any of the amplifier power units, so state under proper heading.)

Transformers:
Make & model _____
Number of transformers _____
Serial Nos. _____
_____
Input voltage & cycles _____
Output voltage _____
Capacity, watts _____
Where located _____

Rectifier Units:
Type _____
Make & model _____
Number of units _____
Serial Nos. _____
Input A. C. voltage _____
Output voltage _____
Capacity, watts _____

If Tube Rectifier:
Number of tubes _____
Type No. tubes _____
Filament voltage _____
Filament current _____

Plate voltage _____
Plate current _____
Specifications of filter apparatus _____
_____
Where located _____

Batteries:
Type _____
Number of batteries _____
Total outpnt, volts _____

Battery Chargers:
Type _____
Make & model _____
Number of chargers _____
Serial Nos. _____

If Tunger Type:
Number of tubes _____
Type No. tubes _____
Input A. C. voltage _____
Output voltages _____
Where located _____

Motor-Generators:
Make & model _____
Number of sets _____
Serial Nos. _____

Motors:
Serial Nos. _____
H. P. _____
Volts _____
Cycles _____
Phase _____
Speed _____

Generators:
Serial Nos. _____
Output voltage _____
Capacity, watts _____
Filter apparatus _____
_____
Where located _____
Is exciter power adjustable? _____
_____
Voltage required _____
Current required _____
Power supply for exciting lamps, remarks _____
_____
_____

Speaker Fields (If speaker fields are supplied by any of the amplifier power units, so state under proper heading.)
Number of stage speaker fields supplied _____
Number of monitor fields supplied _____

D. C. Mains:
Voltage of mains _____
Voltage used _____

Resistance Units:
Type _____
Specifications _____
_____
Where located _____

Rectifiers:
Type _____
Make & model _____
Number of units _____
Serial Nos. _____
Input A.C. voltage _____
Output voltage _____
Capacity, watts _____

If Tube Rectifier:
Number of Tubes _____
Type No. tubes _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____
Specifications of filter apparatus _____
_____
Where located _____
_____
_____

Tap on arc current supply (If speaker fields are supplied by arc generator or rectifier, give details)
_____
_____
_____

Do speaker field coils act as filter chokes for any part of system? _____
_____
_____

Current supply for speaker fields, remarks _____
_____
_____

2. AMPLIFIERS

Make & model power amplifiers:
1st _____
2nd _____
3rd _____
4th _____

Serial Nos. of amplifiers:
1st _____
2nd _____
3rd _____
4th _____

If separate photocell amplifiers are used:
Make & model _____
Number _____

Serial Nos:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Number of amplifier channels _____
Total no. of stages per channel (including gain amplifiers) _____
_____
Total gain, db _____
Total output, watts _____

Reproduced frequency range, cycles per second:
Low limit _____
High limit _____
Remarks _____
_____
_____

(In the following, do not include rectifier tubes.)

Photocell amplifiers: (To be filled out only if separate photoelectric cell gain amplifiers are used.)
Half-wave or push-pull _____
How coupled to photocell _____
_____
How coupled to following stage _____
_____
Tubes per amplifier _____
Type No. tubes _____
Type filaments _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____

First power stage:
Half-wave or push-pull _____
How coupled to photocell or to pre-amplifier _____
_____
How coupled to second stage or output _____
Number of tubes _____
Type No. tubes _____
Type filaments _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____

Second power stage:
Half-wave or push-pull _____
How coupled to third stage or output _____
_____
Number of tubes _____
Type No. tubes _____
Type filaments _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____

Third power stage:
Half-wave or push-pull _____
How coupled to fourth stage or output _____
Number of tubes _____
Type No. tubes _____
Type filaments _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____

Fourth power stage:
Half-wave or push-pull _____
How coupled to subsequent stage or output _____
_____
Number of tubes _____
Type No. tubes _____
Type filaments _____
Filament voltage _____
Filament current _____
Plate voltage _____
Plate current _____
Remarks _____
_____
_____
_____

Motiograph's Wide-Latitude Shoe Tension Adjustment

By EMIL WIENKE
Chief Design Engineer, Motiograph, Inc.

The latitude of tension provided on the Motiograph AA and AA-2 projectors—ranging from 8 to 24 ounces of pressure—has occasioned a measure of surprise in some projection circles, notably among certain British commentators. The reasons prompting the adoption of this range of tension and its method of application are explained here by Motiograph's chief design engineer.

THE primary function of the tension shoes is to flatten out the film as it passes through the projector film gate so that there will be no tendency for the projected picture to have an in-and-out-of-focus condition. As prints are received by theatres in widely varying condition, it is highly desirable that the projectors be equipped with a device that will permit instantaneous change of shoe pressure during operation, for with such a device a good clearly defined picture can be obtained regardless of the condition of the print.

The majority of projectors installed in our theatres do not have such a device, consequently unless the degree of tension of the shoes of these projectors is in direct relation to the condition of the print being run, a generally poor picture could easily result. Variance in quality of the projected picture is particularly noticeable when a new print and an old one are run during the same show.

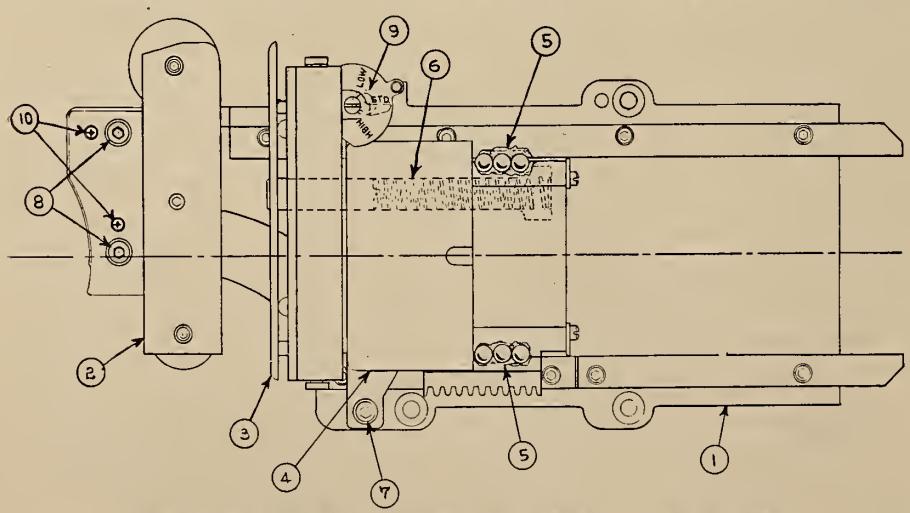
The importance of furnishing in their projectors a variable shoe tension device capable of operation while the projector is running is being recognized by the three leading manufacturers of projectors. Two supply such a device on both models they produce, and another in its higher priced model.

Thumb-Screw Tension Setting

In the projectors made by two manufacturers the degree of shoe tension can be changed by turning a thumb screw. These devices make possible a decided improvement in the projected picture over that possible with projectors without such a device. The degree of tension being applied by thumb-screw operation, however, still is subject to human error as the screw of one tension device could easily be turned farther than the screw on the other projector. It is possible, therefore, that there could be a variance in the projected picture from two projectors in the same room, even though the prints being run were in identical condition.

In order to determine the proper degree of shoe tension that should be applied to film in various conditions to produce maximum screen results and minimum wear on film, Motiograph conducted a long series of tests. Brand new film was run through its AA projector at varying degrees of shoe pressure to locate the lowest possible degree of pressure at which a fine quality picture resulted. After running a long series of tests it was decided that a pressure sufficient to cause a film pull tension of 8 ounces would produce best results.

Similar tests were made with film that had passed the first-run stage and it was found that a tension of 12 ounces was most desirable. Badly buckled, often spliced film required the much greater tension of 24 ounces to produce anywhere near satisfactory picture results.



THE GATE ASSEMBLY OF THE MOTIOGRAPH AA PROJECTOR

The spring (6) systematically closes the gate when the operating control catch is released. The fixed light guard casting (4) covers the end of the projection lens nearest the film plane to prevent any stray light leakage. In the tension shoe unit proper (3) tension is applied by the semi-circular projections visible between the shoe runners and the gate body. Variable pressure is applied to the centers of these bars by flat springs on a vertical shaft whose mounting screws are visible at the top and bottom of the gate body. The setting controlling the degree of tension may be changed with the projector in operation.

Motio's Cam-Operated Unit

To give any of the three degrees of pressure as required, Motiograph provides in its AA and AA-2 projectors a cam-operated tension device that permits the projectionist to flip a small lever to bring about the desired degree of tension. Careful checks of installations have shown the wisdom of having but three definite degrees of tension instead of a large number of different degrees.

While it is true that wear on film is increased as shoe tension is increased, Motiograph tests showed that the extent of wear at the greatest degree of tension employed in the AA projector was not of great importance considering that the heavier tension is needed only on films which are near the end of their useful life. These tests did clearly prove, however, that extreme shoe pressure could create excess film wear by forcing the film out of alignment if the film were not properly edge-guided through the film gate. This is particularly true with shrunken film.

The tests also proved that the best method of guiding the film through the film gate was the provision of two film guide rollers at top and bottom of the film gate which would automatically adjust themselves to the width of the film being run. For this reason, Motiograph discarded the conventional studio guides employed in many projectors in favor of two self-adjusting film guide rollers.

Studio guides work only on film of the exact dimensions for which they are set, and are either useless or cause buckling of film if other degrees of shrinkage are run.

New Ultra-Speed G.E. Camera

A camera which has a speed of one-millionth second and produces a finished negative within 30 seconds is announced by General Electric Co. The camera was developed for rapid testing, by means of electric power surges, of apparatus used in the generation and transmission of electric power. G. E. engineers said the camera was not intended for ordinary photography, although the principles involved could be applied.

The camera weighs more than 40 pounds and is two feet long and one foot in height and width. The developing equipment requires electric motors for power supply.

HISTORICAL DEVELOPMENT OF SOUND FILMS

(*Continued from page* 8)

Both a physical slit and an optical slit are disclosed.

This seems to me to be an important patent that has heretofore been overlooked. It clearly anticipates Ries (1913) as may be seen from the following quotations: "According to the record part of the invention a variable beam of light is caused to pass through a fine slit or other opening, and an image of the slit enlarged, diminished, or of the same size is then projected, by means of one or more lenses or other suitable devices, upon a sensitized tablet which is moved progressively in front of the slit"; and "Sometimes it is desirable to use a second slit close to the recording tablet".

1887: The work of Hedick, a Dutch inventor, using flames that could be varied by sound waves, should be noted.[7]

1887: C. J. Hohenstein patented a more sensitive method of recording a sound modulated light beam "by reflecting light from a small pivoted mirror several times, focusing beam of last reflector, which is parabolic, upon a photographic film".[8] This is quite similar to the optics of the recording system later developed by General Electric.

1892: Demeny's "Chronophotophone" combined a disk phonograph and a magic lantern arranged with slides.[9]

1894: Edison brought out the "Kinetoscope".[10] This was a peep-show device using ear tubes to catch the sound, and rather crudely brought about synchronization of sound and picture.

1900: J. Poliakoff filed a patent application on the focusing of a light beam upon a photoelectric cell, through a positive photographic sound record moving uniformly across the beam, the photoelectric cell being connected to a telephone circuit.[11] This disclosure is interesting in that it mentions the first use of a *positive* record and also a photoelectric cell for reproducing.

Ruhmer Inclusive, Practical

1901: Ernst Ruhmer began publication of his work on sound recording.[12] Since he was a professor, his interest was more academic than commercial. He devised the "photographophon," an instrument something like the sound camera of today. With this he recorded and reproduced speech using arc lights and Gehrke tubes as light sources, and selenium cells in reproducing. His film speed was rather high, being of the order of three meters per second.

Ruhmer's original "photographophon" and some sound records were brought to this country by the Fox Film Corp. The apparatus was practical and the records show clear definition of the recorded sounds. Although Ruhmer never commercialized his work, he says in one article:

"For practical uses the application of the photographophon in combination with the kineomatograph whereby on one and the same film both motion and speech may be recorded should be kept in mind." Also in another article, "As far as simplicity is concerned, the glow light tube surpasses all other previous means for the perception of a.c. curves."

1902: An inventor named Hulsmeyer obtained a patent on producing photographic sound records.[13] This describes "an oscillating mirror which is varied by sound-electric impulses and which reflects a beam through a plate on a photographic strip, through a slit, said plate having a transmission varying in the direction of motion of the reflected beam in proportion to the sine of the angle".

1902: On Nov. 8 a patent application was filed by William Duddell covering a

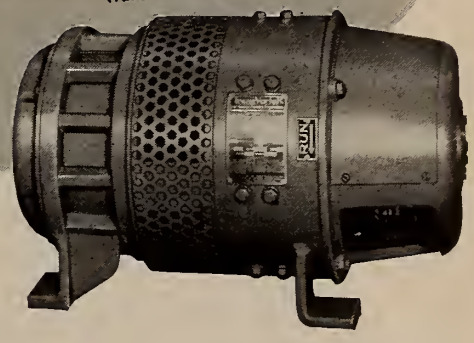
[7] *J. Soc. Mot. Pict. Eng., XVI*, 4. p. 405.
[8] U. S. patent No. 356,877.
[9] Hays: "See and Hear," p. 38.
[10] Hays: "See and Hear," p. 39.
[11] U. S. patent No. 680,614.
[12] *Anal. der Phys.* (1901), p. 803; *Phys. Zeit., 34* (1901), p. 498; Ruhmer: "Wireless Telephony," p. 36.
[13] British patent No. 19,901 (1903).



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method of variable area recording and reproducing, under the title of "An Improved Phonograph". The patent shows a comprehensive knowledge of the subject and mentions making photographic copies.

1903: Wilhelm Asam filed a patent to produce records for phonographs using a reflecting diaphragm to modulate a light beam.[14]

1904: F. W. LeTall patented a method for modulating electrically a vapor discharge.[15]

Poulsen's Paramagnetic Wire

1904: A patent was granted to V. Poulsen (filed in 1901) on a method of magnetizing a moving paramagnetic wire or tape by means of sound waves.[16] It also showed means of demagnetizing or obliterating the magnetic variations along the wire.

1906: Eugene A. Lauste, formerly an Edison employee, with Robert R. Haines and John S. Pletts filed a patent application on "method and means for simultaneously recording and reproducing movements and sounds".[17] Although Lauste has been credited by some writers as having the master patent on talking pictures, one is impressed upon examining his patent that he really does not express himself too clearly regarding his technique.

1907: J. F. Dirzuweit patented a photographic method of recording and reproducing sound. He also shows the use of a gas discharge tube for recording. The claims of this patent are rather broad, for instance, "Claim *8*—A sound recording apparatus comprising a photosensitive surface and a source of actinic rays movable relative one to the other, and means for exciting said source of actinic rays by and in accordance with sound waves".

1907: Carl Laemmle, of Universal Pictures Corp., tried to commercialize the "Synchroscope." a system using a phonograph.[18] He achieved some success, but it was found that the regular records used were too short.

de Forest Adds the Grid

1907: Dr. Lee de Forest filed his patent application on the "Audion" covering the addition of a third electrode or grid to the Fleming valve.[19] This became a basic patent of great importance, as it showed the way to make amplification of electrical impulses possible.

1908: A. Manuelli, a resident of Italy, obtained a French patent having "as its object a bicinematographic photophonic machine for public and private displays adapted to insure fixedness of projection, stereoscopic effect, photographic reproduction of sound, *etc.*" He describes a complicated machine using three films.[20]

1908: About this time Edison again brought out another version of his talking picture device, this time called the "Cameraphone". The picture was photographed to synchronize with a phonograph record. As no close-ups were then employed, exact synchronism was not an important factor. It was accepted for a short time only, as a novelty.

1908: J. F. Child patented the making of a photographic record of a monometric gas flame and the use of selenium in reproducing the record.[21]

1910: R. O. P. Berglund, of Sweden, patented recording sound using a mirror attached to a microphone diaphragm, thus modulating a light beam and recording the variations on a sensitive disk or film.[22]

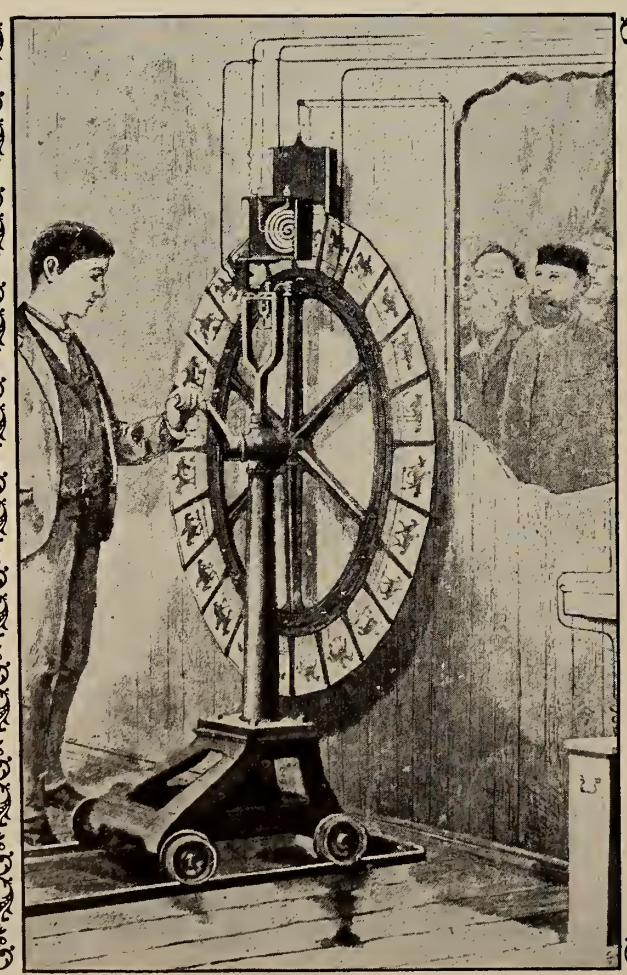
1911: C. G. Timm obtained a Swedish patent similar to that of Berglund.[23]

1911: F. D. Pudumjee, of India, described a method of using a mirror attached to a vibrating diaphragm to produce a photophonograph.[24]

'Simultaneous' View-Sound Film

1912: I. H. MacCarty, a resident of the U. S., obtained a French patent covering "simultaneous recording by means of photography upon one and the same films

[14] British patent No. 4,661 (1903).
[15] British patent No. 1,364, (1904).
[16] U. S. patent No. 788,728.
[17] British patent No. 18,057 (1906).
[18] Hays: "See and Hear," p. 40.
[19] U. S. patent No. 841,387.
[20] French patent No. 386,737 (1908).
[21] British patent No. 4,391 (1908).
[22] British patent No. 12,161 (1910).
[23] Swedish patent No. 31,472.
[24] British patent No. 1,532 (1911).



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of animated views and articulate or other sounds with a view to insure synchronous reproduction of such views and sounds".[25] (His drawing of a combined sound and picture film showed a much keener appreciation of the problem than was shown by Lauste.)

1913: Edison brought out the "Kinetophone".[26] This apparatus tried to create synchronism of picture and sound by using a belt connection between a phonograph on the stage and a projector in the picture booth. It had a run of about 16 weeks in the B. F. Keith theatre in New York, but attained no great commercial success.

1913: A patent application for recording sound filed by E. E. Ries was granted in 1923.[27] The following claim from the recording patent gives an idea of its scope: Claim *14*—"The method of producing motion pictures and photographic sound records concurrently upon the same photographic film, which consists in moving a photographic film through a camera at a speed adapted to produce a given number of pictures per second, simultaneously moving said film at the same rate per second across the back of a screen having a narrow aperture which exposes the sensitized surface to light in a continuous line or band parallel to the line of pictures and of uniform width throughout its length, limiting the area of exposure to the area of the aperture, and varying the degree of exposure of said line or band in accordance with sound waves impressed upon a sound translating device, whereby said sensitive surface when developed will present adjacent to the pictures a continuous line or band of uniform width and having alternating sections of varying degrees of density of translucency representing continuous waves corresponding to the sound waves impressed upon the sound translating device."

A similar patent covering reproducing was also filed in 1913 and granted in 1926.[28]

Ries Patent Value Mushrooms

In view of the decision in the de Forest-Stanley case, where the Ries reproducing patent was held infringed, it is interesting to note that Ries came to Auburn to see Case in 1923 and offered to sell his patents for $1000. Also, that opinions by Thompson and Gifford (Mr. Case's patent attorneys) in 1925 were to the effect that it was very doubtful that these patents would be upheld in Court. Ries later sold these patents and several other applications to the de Forest company.

1914: H. G. Stocks filed a patent application covering the process of recording sound photographically by modulating a mercury lamp for the purpose of making an optical phonograph.[29]

1915: H. C. Bullis filed a patent application that was granted in 1920, describing a double system method of recording sound and picture on separate films, running synchronously through a single machine, and the use of marking lights to enable matching of sound and picture after the films were processed.[30]

1916: T. H. Nakken obtained a patent on a means for converting sound waves into light variations; also a patent on means for transforming light impulses into electric current impulses.[31]

The various Nakken patents were purchased by the Warners, after having been offered for sale for some time by the inventor.

1918: A. C. Rutzen received a patent to engrave a sound track on a moving picture film adjacent to the picture. J. Ballance received a similar patent in 1906. Again in 1926, E. H. Foley proposed the use of a separate film for an engraved sound record. None of these methods has been practical.

F. L. Madelar cut his record on the back of the film in the nitrocellulose base with a diamond stylus. Later, similar patents were granted to A. L. Curtis and J. Kaiser.[32]

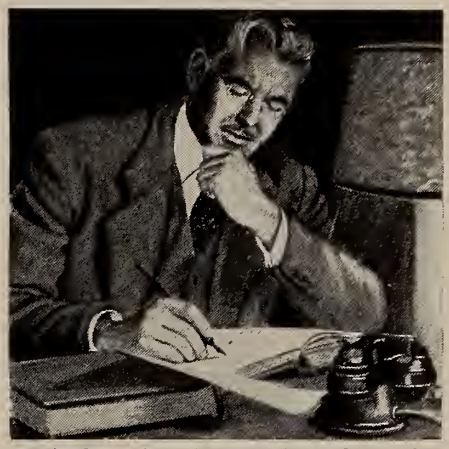
The Famous Tri-Ergon Patents

1918 on: During the summer of this year, experimental work was begun by the German Tri-Ergon group consisting of Josef Engl, Joseph Massole, and Hans Vogt.[33] They worked out a system of

[25] French patent No. 448,757 (1912).
[26] FRANKLIN: "Sound Motion Pictures," p. 5.
[27] U. S. patent No. 1,473,976.
[28] U. S. patent No. 1,607,480.
[29] British patent No. 20,798 (1914).
[30] U. S. patent No. 1,335,651.
[31] U. S. patent No. 1,522,070 (Reissue No. 16,870).
[32] U. S. patent Nos. 823,022; 1,275,189; 1,589,139; 1,591,081; 160,566.



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making sound motion pictures using a glow discharge lamp in photographing the sound. The sound was recorded on special film having standard-sized pictures and a space outside of the sprocket holes for the sound band.

At the time this system was brought to this country by Fox (1926) it had many novel features but the results were quite inferior to those obtained by Fox-Case methods.

Tri-Ergon obtained about 18 patents on their system between April 1919 and July 1923. Some of these patents—such as the printing patent, the flywheel patent, and the photoelectric cell patent—were so basic that they later were the cause of extensive litigation and nearly became controlling factors in sound recording and reproduction. The Supreme Court reviewed the flywheel patent and held it invalid (Mar. 4, 1935).

1918 on: J. Tykociner, at the University of Illinois, worked out a system for producing talking pictures.[34] This work was quite academic and no attempt was made to commercialize it. Variable-density recording was used. Sound and picture were combined on the same film, the sound track being placed inside the sprocket holes and adjacent to the pictures. The system was called "Phonactinion". The sound was recorded by modulating luminous gas discharge devices.

Tykociner's paper contains a rather extensive discussion on recording sound. He made several demonstrations before scientific societies. Later he suggested a novel means of recording that was considered quite seriously by Case at one time. This consisted of forming a glow discharge between two closely spaced semi-conductors in air. The separation of the electrodes acted somewhat like a slit, in that it limited the area of exposure on a photographic film placed adjacent to the glow. So far as I know, the merit of this method of recording has never been verified.

1920: D. A. Whitson filed a patent application for producing sound records by passing a beam of light through a Kerr cell, and modulating the latter magnetically, the resulting light being photographed on a moving film through a slit.[35]

1921: Prof. H. O. Rankine, of England, worked out a method of recording sound photographically using a constant light source and controlling the light beam from this source by means of a mechanical "light valve". He used one fixed grid and one movable unit that was controlled by the sound impinging upon a microphone diaphragm. This work was academic and in the nature of a laboratory demonstration.

1921: Grindell Matthews devised a mechanical method of recording sound photographically by producing vibrations of a beam of light from a constant light source.

First Dual Film System

1921: A demonstration by Professors Aurbenius and Montellius was described in the London *Times*, Sept, 24, 1921. Two films were used, one for picture and one for sound. They were run in separate machines geared together. The sound record was produced in a manner similar to that employed by Matthews.

1923: The Peterson-Poulsen system was worked out in Denmark. It used a variable-area method of sound recording on a separate film run synchronously with camera and projector. The sound record was made using an oscillograph and a small slit. The process was exploited by Tonfilm, in Germany. The reproducer used a selenium cell.

1923: A U. S. patent was issued to E. Peterson, showing a variety of arrangements of a magnetic wire imbedded in the marginal portion of a motion picture film.

[To be Continued]

[33] Vierig and Lohn: "Der Toewende Film," *Jour. Engl. Pub.* (1927).
[34] *Trans. SMPE, 16* (1923), p. 90.
[35] U. S. patent No. 1,474,695.

Griswold Splicer to Neumade Products

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IN THE SPOTLIGHT

(*Continued from page* 21)

ments covered by the latest report, 3,825 or nearly 20 per cent were illegally employed. The proportion of employed minors under 18 who were employed illegally had almost trebled.

Of the 3,825 minors under 18 found to be illegally employed, 3,390 were children 15 years of age or younger. There were 435 minors 16 or 17 years of age employed in hazardous occupations in violation of orders issued under the Act.

• An avowed Republican for 20 years, Edward H. Weyler, secretary-treasurer of the Louisville State Federation of Labor, is now registered as a member of the Democratic party. In a letter sent out to 600 Local Unions in Kentucky, Weyler made his position clear with the following statement:

"What's the use of voting in the primary for a group that your better sense tells you you have to beat anyway? I was hoping that when the Republicans got back in power they would have some sense. Instead, they turned out to be malicious labor-haters."

• Russell McCullough, member of Los Angeles Local 150 and director of television for National Theatres, has been appointed chairman of the television committee for the Academy of Television Arts and Sciences. This committee will investigate developments and set standards for theatre television. The right man for the right job, say we.

• We don't think that Charles Pollard, projectionist of the Silver Theatre, Clarence, Mo., will attempt to put out another film fire with a fire-extinguisher. When several reels of film became ignited, Pollard attempted to put out the flames with a fire extinguisher, but it proved most ineffective. Were it not that the projection room was fire-proofed and the flames confined therein, a far different story might be told today.

• Ivan Lemkowitz, business agent of Local 353. Port Jervis, N. Y., and chief projectionist at the Fabian Strand Theatre, is honeymooning in Canada.

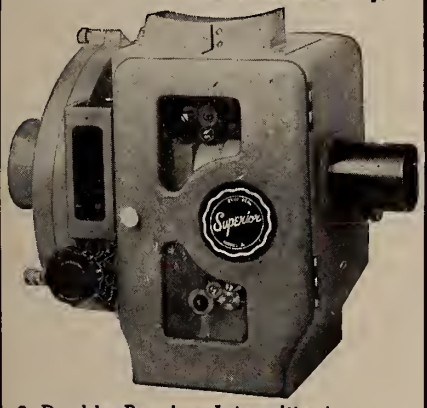
• The International Projection Society, sponsored by members of Toronto Local 173, is now in full swing and we understand that the attendance at the weekly meetings has been steadily increasing. It is difficult for a new idea to catch on and win support, but the officers of this newly-formed educational organization are gratified with the progress made and hope, in due time, to gain the backing and support of the entire Local membership.

The Society's official organ, SPI, is a breezy, newsy, informative sheet, and we congratulate editor Sam Bowes on the fine job he is doing.

Voltage Regulation Data Book

A fully illustrated 12-page bulletin on voltage control has just been released by the Superior Electric Co. This bulletin, No. 547, features the latest developments in Powerstat variable transformers and Stabiline automatic voltage regulators. All the information on voltage control equipment necessary to management, designers, and engineers has been included in concise, easily-read form, together with ratings, detail drawings, photographs, and performance and engineering data. Copies of this bulletin are available upon request to Superior at 253 Church St., Bristol, Conn.

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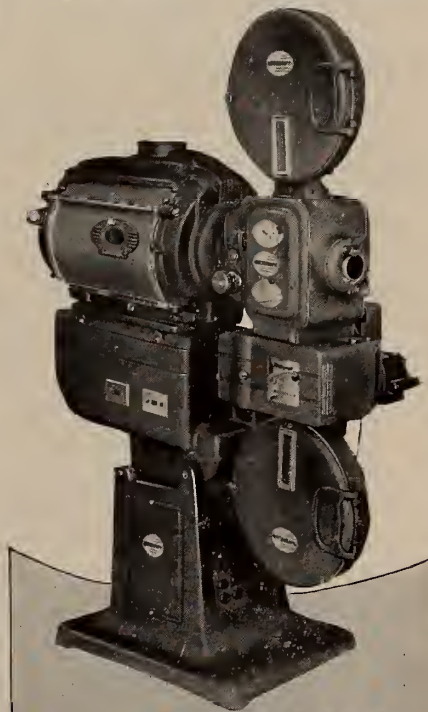
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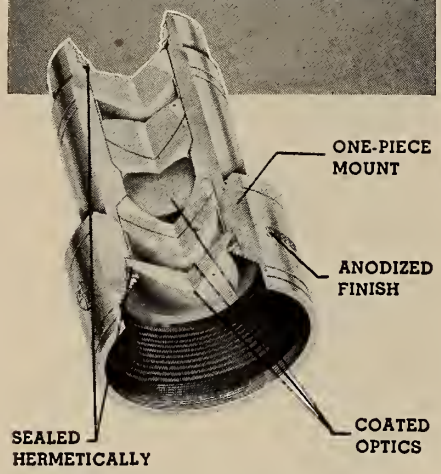
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ANODIZED FINISH ...
The gleaming gold finish of the Super-Snaplite is an integral part of the aluminum ... it can't chip or flake off!

COATED OPTICS ...
Durable anti-reflection coating on each glass-to-air optical surface nearly *doubles* the light transmission ... gives brighter pictures, higher contrast!

SPEED OF f/1.9 ...
Exceptional speed for the utmost in screen brilliance without extra current consumption!

Super-Snaplite lenses are stocked in focal lengths from 2" through 5" in ¼" steps. Speed of f/1.9 is maintained in all focal lengths from 2" through 4½". Other Snaplite lenses include the Series I and f/2.0 Series II. For complete details on all Snaplite lenses, get Bulletin 203 from your local supply dealer.



KOLLMORGEN Optical CORPORATION
2 Franklin Ave.
Brooklyn 11, N.Y.

I. A. ELECTIONS

LOCAL 301, NEW BRITAIN, CONN.

Joe Kneeland, *pres.;* Daniel Grenier, *vice-pres.;* Felix Stapanik, *sec.;* Howard Richardson, *rec.-sec.;* Fred Matthews *bus. rep.;* Kneeland, Grenier, Stapanik, Richardson and Matthews, *executive board.*

LOCAL 373, TERRE HAUTE, IND.

M. B. Link, *pres.;* E. J. Kirk, *vice-pres.;* G. H. Fagg, *sec.;* H. M. Lindley, *treas.;* Bert Steinhauser, *bus. rep.;* W. Musgraves, *guard;* J. H. Carsey and E. F. Brown *executive board.*

LOCAL 486, HARTFORD, CONN.

Charles Albee, *pres.;* Bob Cormier, *vice-pres.;* Pete DeCarli, *rec.-sec.;* Don McDonald, *cor.-sec.;* Charlie North, *bus. agent.*

Boyce Nemec Is Named Executive Secretary of S.M.P.E.

Boyce Nemec, Engineering Secretary of the Society of Motion Picture Engineers for the past 18 months, has been appointed Executive Secretary to succeed Harry Smith, Jr. Nemec, while attending University of Minnesota, was a member of the university's Visual Education Department, and on joining the Regular Army in 1941 he was assigned to the Signal Corps Training Film Production Laboratories.

He served as secretary of the Interim Armed Forces Committee on Photography until the main project got under way, and then represented the Signal Corps engineering and procurement interests on the War Committee Federal Specifications Committee and Joint Army-Navy Specifications Board as Chief of the Signal Corps Photographic Unit.

Nemec spent the last two years of his army career as assistant to Major Lloyd T. Goldsmith, then director of the Pictorial Engineering and Research Laboratories. On leaving the army, he went directly to S.M.P.E. as engineering secretary to carry out the Society's greatly enlarged standardization and engineering program.

Tom LoGiudice has been named Staff Engineer, taking over the engineering committee work, technical reports and other duties formerly handled by Nemec.

Margaret C. Kelly becomes office manager in charge of the physical operation of the Society's headquarters.

Helen M. Stote has been appointed Editor of the monthly *Journal,* and in charge of all printing done by the Society.

Wenzel Projector 25th Anniversary

The Wenzel Projector Co., of Chicago, makers of the Ace projector and other projection accessories, is observing its 25th anniversary. Founded in 1922 by Mack and Fred Wenzel, the former's untimely death several years ago resulted in Fred assuming sole direction of the business.

SIX-PHASE MEANS NO FLICKER

Only "C&C" Offers You SIX-PHASE Full Wave Rectified Power
(Actually equivalent to 12-phase half wave)



Type H28 - 70 (70 Amp.) SIX - PHASE RECTIFIER
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MOTION PICTURE Theatres all over the U. S. and many Foreign Countries enjoy better projected light through rectified power from the new "C&C" SIX-PHASE Rectifiers. SIX-PHASE full wave rectification eliminates ripples and disturbing harmonics unavoidable in conventional three-phase rectifiers. The superiority of "C&C" SIX-PHASE rectifiers is universally recognized by experts in projection. This new development in motion picture projection is backed by over 15 years of research and engineering in the rectifier field.

With progressive theatre owners the "C&C" SIX-PHASE full wave rectifier is fast becoming standard equipment. For a more perfect light on your screen, investigate the "C&C" SIX-PHASE Rectifier.

Quality Equipment Pays Off at the Boxoffice
Write for complete information about the new SIX-PHASE Arc Lamp Rectifier

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PERSONAL NOTES

H. BENTLEY MACKENZIE, formerly manager of the Western Electric Co., Inc. of Argentina, has returned to New York to take up new duties as assistant to the regional manager of Westrex Corp., parent organization of the foreign subsidiary. MACKENZIE served 10 years in Argentina, prior to which he spent 6½ years as an ERPI representative in the Orient.

HARRO ZEPPELIN will succeed MACKENZIE in the Argentine post, and also will supervise activities in Paraguay and Uruguay.

* * *

STANLEY BRACKEN, executive vice-president of Western Electric Co., has been elected president to succeed CLARENCE G. STOLL on his retirement September 30. Mr. STOLL has served as president of the Company since 1940, and his retirement brings to a close a distinguished career of more than 44 years in W.E. Mr. BRACKEN has had more than 35 years of experience in the Company's manufacturing organization.

* * *

HERBERT C. ELWES has been named Manager of Commercial Sound Sales for RCA. Formerly Photophone sales manager in Boston and Merchandise Manager of the Theatre Equipment Section, ELWES will direct sales of industrial sound systems, intercom units, coin-operated radios and wire recorders.

A. J. Palmer Named President of Ampro 16-8 mm Projector Unit

ONE of the least publicized motion picture equipment manufacturing executives was thrust (literally) into the spotlight recently when A. J. Palmer was elected president of Ampro Corp., of Chicago, Ill., manufacturers of 16- and 8-mm movie projectors. Palmer succeeds Axel Monson, founder and president of Ampro since its beginning, who will continue to serve as chairman of the board.

Palmer's important rating in things motion picture technical may best be assayed by a listing of his present affiliations. He joined General Precision Equipment Corp. in 1936



A. J. Palmer

as assistant to the president, Earl G. Hines, and from there went on to his present status as v.p. and director of this company and an officer in many of its subsidiaries:

Executive v.p. and director of International Projector Corp., Bloomfield, N. J., president and director of Cine Simplex Corp., Syracuse, N. Y.; and a director in the following units: Askania Regulator Co., Chicago; Bizzelle Cinema Supply Corp., N. Y. City; Librascope, Inc., Burbank Calif.; J. E. McAuley, Chicago; Motion Picture Engineering Corp., Chicago; National-Simplex-Bludworth, Inc., N. Y. City; Strong Electric Corp., Toledo; Theatre Equipment Contracts Corp., N. Y. City; and General Precision Labs, Inc., Pleasantville, N. Y.

Stating that he expects to further correlate Ampro's operations with the great resources and technical skills of its parent company, which has achieved such dominance in the 35-mm field, Palmer expresses his business philosophy thus:

"Constant improvement of product."

FOREST RECTIFIERS

The New and Highly Improved 6-Tube Rectifier

SINGLE-TYPE 75-V-6 and TWIN TYPE 75-V-12. Embodying the advanced knowledge gained from building rectifiers for radar and other highly scientific projects where perfection of performance and reliability are of paramount importance. Designed for all theatres using Suprex or Simplified High Intensity Projection. Built-in remote control relays with provisions for operating spotlights. 40 to 75 amperes DC current, 3-phase rectification.

Also: LD-60 and LD-30 Bulb Type Rectifiers, SUPER MCS Rectifiers, Rectifying Tubes, Sound Screens

FOREST ARC LAMPS

The New Electronic Control Projection Lamp

The superiority of the Forest ELECTRONIC CONTROL Arc lamp has become the talk of the industry! It features a completely new and faultless method of feeding positive and negative carbons by ELECTRONIC CONTROL, assuring arc control of precision accuracy, maintaining the exact focal point necessary for producing maximum light intensity at all times without constant watching and adjusting. No carbon feed motor—no gears—no clutches—no cams—no gadgets—no fast moving parts! Nothing to get out of order.

LARGE LAMP, 14" reflector. 1 KILOWATT, 10¼" reflector. LOW INTENSITY, 10¼" reflector.

FOREST MFG. CORP. 60 PARK PL., NEWARK, N. J.

NOW NEW BRENKERTS, DeVRYS, MOTIOGRAPHS ARE FACTORY EQUIPPED WITH "ZIPPERS"

Convincing proof of the equipment manufacturer's change-over preference, is the selection of Strong "*Zipper*" Changeovers as *standard factory equipment* on new "AA" MOTIOGRAPH, new postwar DeVRY, and the new BRENKERT theater projectors. Strong "*Zipper*" Changeovers are available in three models: Strong *Special* (for porthole installation), Strong *Zipper* for sight alone or sound alone, and Strong *Dual-Purpose Zipper* for both *sight and sound.* Essannay Electric Manufacturing Co., 1438 N. Clark, Chicago 10.

IATSE 110

STRONG'S Zipper CHANGEOVERS

AN ESSANNAY ELECTRIC MANUFACTURING PRODUCT

LETTERS TO THE EDITOR

(*Continued from page* 19)

problem with these prints is that of focus because the film has emulsion on *both* sides and only one side of the film can be clearly focused. Sounds strange, I know, but it's so.

The All-Purpose Cement we have on hand will *not* hold a splice on this acetate stock even as well as the Regular cement. I have followed the instructions very carefully as to scraping both sides of the film and allowing the splice to remain clamped longer than usual; but those splices made with the All-Purpose cement come apart during projection, while the splices made with Regular cement hold through the projection run.

I can't say much as to the wearing quality of acetate film, since the longest we run a print is two days, but I find that it has a tendency to become more brittle and is not nearly as flexible as the nitrate stock.

Overall, the biggest difficulty is with the two-emulsion acetate stock. Not only is it difficult to splice securely but it also induces eyestrain.

R. A. Young.

Homestead, Florida.

To the Editor of I. P.:

. . . Is there one safe, sure method of cleaning a lens that is recommended not by self-appointed oracles but by reputable manufacturers or by those who have had long experience with handling lenses? Or, should the non-expert "meddle" with lenses?

W. R. Randall.

Los Angeles, Calif.

● While not aware of the scope of the word "meddle" as used by our correspondent, we should say that frequent cleaning and also actual testing of lenses in constant use is highly advisable. Accidental damage of a minor nature, or looseness of the lens in its mount due to vibration or shock, can be detected and remedied before they become so serious as to impair quality performance.

Deterioration in optical performance can be detected and traced to its source, and can often be remedied if caught in time. The most common occurrence of this sort is the "feathering" of the balsam used to cement some of the glass elements together. Lenses can be cleaned thoroughly when they are tested by someone skilled in this type of work. Lenses are damaged by careless or ignorant cleaning more than by any other cause.

Absorbent cotton is cheap, soft and in every way one of the best cleaning materials available. Breathing gently on the surface will moisten it and greatly facilitate the removal of dust and spots. *Cleaning solutions and soaps should be avoided.*

Anything that will not yield to the moisture of the breath can be removed by barely moistening the cotton with carbon tetrachloride. Nothing more severe than this should ever be used. Always clean lenses with a circular motion, blowing strongly against the surface with the last few strokes to remove any lint.—Ed.

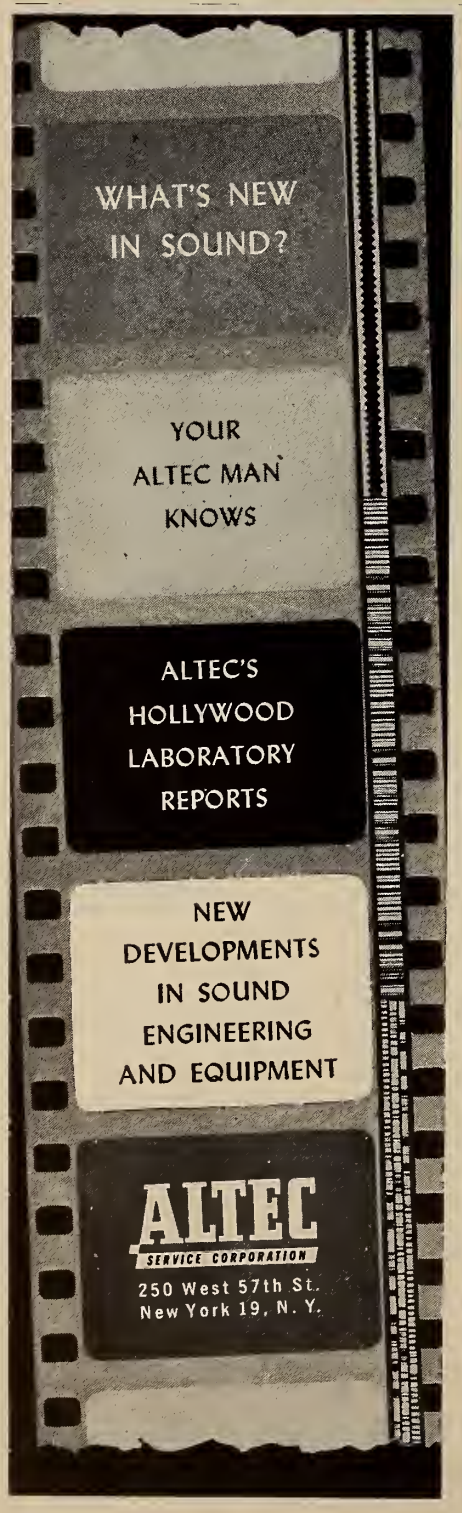
To the Editor of I. P.:

You're on the right track with your advocacy of a film inspection form in duplicate ("Monthly Chat" for May, 1947). Also, the film exchanges should jointly issue a manual on the correct handling of film, including splicing, rewinding, shipping, *etc.* Once a theatre gets a bill for damaged film it will see to it that all film is inspected *prior* to running.

We have a date trailer that has run 1460 times and still hasn't a scratch on it. I don't suppose this is a record in your long-run film derby, but it's pretty good for a print still in swell condition.

E. A. Snow.

Twin Falls, Idaho.



NEW
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ANENT ACETATE COLOR FILM

(Continued from page 19)

theatres. Moreover, it was Republic's responsibility to distribute the correct cement to its theatre accounts.

The following suggestions by Rosco Laboratories, distributor of an "All-Purpose" cement held to be suitable for *both* acetate and nitrate film, will undoubtedly prove helpful to projectionists:

Acetate Film Splicing Tips

"Our 'All-Purpose' cement has now been on the market for 14 months. In the entire New York Metropolitan area during this period, for example, there have been but three complaints by projectionists about defective splices.

"The reasons for splices coming apart may not be completely attributable to the film cement used, since other factors are involved. For instance, the film may be greasy. The emulsion may not have been completely removed. The quantity of cement used may be insufficient. The cement may have thickened or otherwise deteriorated through long exposure.

"Most acetate color film has emulsion on *both* sides. The film placed on the right side of the splicer should be scraped, and deeply, on the bottom of the film; that on the left side should be scraped on the top of the film. Sufficient cement should be applied so that an even spread over the entire splice area is assured. Two strokes of the applicator should be used, and when a hair bristle brush is used, make doubly certain that sufficient cement covers the entire splice area.

"A metal applicator should be inspected frequently for cleanliness. Clogged grooves impede the flow of cement. It is advisable to count to 20 before releasing the splicer clamp, because with double-emulsion stock it is necessary that sufficient time elapse to permit the cement to bite into the base. Inspect splicer clamps for proper tension, also for proper alignment.

"Projectionists in smaller, subsequent-run houses may encounter film which is quite dry and showing a tendency to become brittle. To meet this condition we suggest a more generous application of cement."

Close Inspection of Prints

It is I.P.'s opinion, based on many inquiries and tests in the field, that the new "All-Purpose" cement will do the splicing job on acetate film, provided that all the conditions outlined herein previously prevail. A deep scrape of both ends and both sides of the film plus ample time in the splicer are "musts" to effect a strong bind.

Projectionists will have to be on the alert from now on as the amount of acetate stock in general release increases. Check the edge-marking of every print used, and be particularly careful to check all splices that might have been made with nitrate cement on previous runs. Both types of cement should be kept on hand, just in case. The cement containers should be kept tightly closed, and the cement well should be emptied, cleaned and refilled frequently.

I. P. will welcome advice from the field anent the splicing, durability, or tendency to brittleness of this new acetate stock.

3000-Frame p/s Eastman Camera

Is the hand quicker than the eye? Not the camera's eye! During a visit in Rochester, New York, Harry Blackstone, the famous magician with "the fastest hands in the world," cooperated with Kodak technicians in a test performed before the Eastman High-Speed camera.

With the camera operating at 3000 frames a second—187 times faster than an ordinary home-movie camera—Blackstone performed several simple tricks. The camera clearly revealed the split-second sleight-of-hand which made each of the illusions possible.

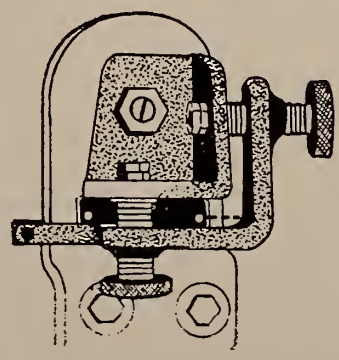


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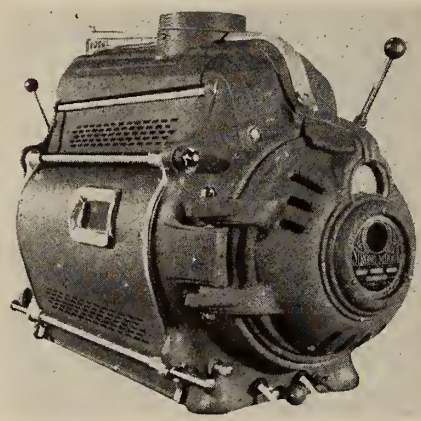
See your local supply dealer or write direct to

HUFF'S, INC., 659 W. Jefferson, Los Angeles, Calif.

TESMA-TESDA Sept. Show Booming

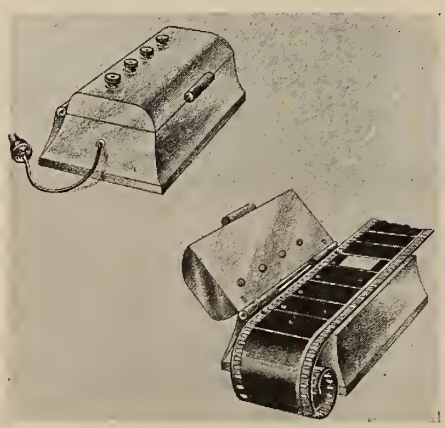
Demand for hotel reservations for the forthcoming TESMA-TESDA joint meeting at the Shoreham, Washington, D. C., Sept. 24-29, has risen to the point where it has been necessary to allocate another 100 rooms and additional equipment exhibition space, announces Roy Boomer, in charge of arrangements. Booth space is going fast, adds Boomer, but there still are some choice locations available. Inquiries should be directed to Roy at 4356 Washington Blvd., Chicago 24, Ill.

Special Pullman cars will be added to the Penna R.R.'s Liberty Limited leaving Chicago the afternoons of Sept. 22 and 23, arriving in Washington the following morning, in addition to a special club car for TESMA delegates. Local ticket agents will arrange reservations for Mid-West conventionites if contacted immediately.



STRONG 1947 MODEL ARCLAMP

This unit, which is proving extremely popular for drive-in theotre use, pulls 70 omperes ot 40 volts. Power supply obtoined via either of two Strong rectifiers: a 3-phose, 6-tube, 80-ompere job, or one for single-phose power having 4 tubes ot 80 amperes.



THE FONTAINE CUE MARKER

Designed by o professionol projectionist, this unit, for both 35- and 16-mm film, conforms to S. R. P. positions without monuol locating of the cues. The marker is first plugged into a light socket, lighting a smoll bulb below the frome operture. Teeth olong the side engage the sprocket holes. With the cover closed, eoch of the four scribers is turned, moking o smoll tronsporent ring on eoch of the stondord frame locotions. Scribers ore built-in to the cover. All working parts to Acodemy specs.

MONTHLY CHAT

(*Continued from page* 3)

complying with many formalities. A union must be authorized or certified as the collective bargaining agent, and the majority of the workers involved must vote for a union shop. Also, the union's officers, when appealing to the NLRB, must make a disclaimer of any Communist affiliation or tendencies.

Another headache is the so-called "feather-bedding" practice. It is openly acknowledged that this section of the Act will react adversely upon stagehands; although during the old War Labor Board days there was an official determination that maintenance men were necessary in a film theatre.

But what about standby men for installation work in theatres and elsewhere? Aimed primarily at the musicians, this proviso will also hit the I. A., a cardinal policy of which for years has been that no such work may be done without a standby crew.

And who shall determine how many stagehands are necessary for a given legit production? Or how many grips are needed on a Hollywood set? Or how many utility men? "Collective bargaining," a phrase which Senator Taft tried strenuously to invest with catch-all, solve-all potentialities, is just a nice sound until managers start insisting upon only 1 man when the Union sets 2 men as the proper figure.

At this point, then, the fun will begin. Can the Union strike to gain its point? Positively not! until they have gone through a lot of hocus-pocus with the new NLRB of so complicated a nature that scores of international unions have already signified their intention of bypassing the Board.

Jurisdictional strikes are out. Squabbles of this nature, too, must go to the NLRB. Positive action by the AFL to keep peace in its family now is a necessity rather than a topic for resounding phrases coined by an investigating committee whose directives could be followed or ignored with impunity.

Secondary boycotts are out. Can studio workers strike to back up their projectionist brethern elsewhere in the U. S.? Or the projectionists strike to back up the studio I. A. members? Positively not! Unions are permitted only to contract NLRB fever in such disputes —and the administration of the law by the Board will largely determine what breaks the unions get.

Finally, unions are subjected to direct filing in the U. S. District Court of suits for breach of contract. The Hollywood jurisdictional fuss would provide producers with a golden opportunity to smash a union by financial starvation induced by terrific damage suits.

Political contributions by a Union as such are also forbidden by the Act; but organized Labor plans to circumvent this feature via individual contributions.

All in all, the Taft-Hartley bill is the perfect springboard for lawyers, labor relations counsellors and other legalistically-minded gentry to collect beaucoup money in fees and expenses—all of it Union money, incidentally.

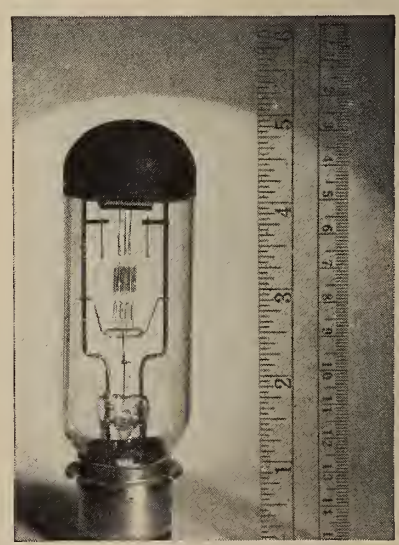
Labor's hope for repeal of the Act within the next two years is at best a rather forlorn hope; but there is a strong feeling among Labor lawyers that some of the more restrictive features of the Act will be declared unconstitutional by the courts. Labor's forthright promise to work for the defeat of every Congressman who favored the Act will have to await the actual doing in a national election—and this opporunity will not come until the Fall of 1948.

The "crystal-clear" language of the Act was ridiculed within a matter of a few days after its passage when the recent coal pact was signed. Representative Hartley immediately charged that the deal was in clear violation of the Act; but Senator Taft saw it as a perfectly legal instrument.

Thus the two guys who presumed to legislate for "an overwhelming majority of the American people" couldn't agree on the meaning of their own handiwork. But everybody else is supposed to conform under threat of stiff penalties. Maybe the National Association of Manufacturers didn't make its aims quite clear.

WESTINGHOUSE SLIDE FILM LAMP

A new high-efficiency tungsten filament lamp for slide film projectors is available from the Westinghouse Electric Corp. This new lamp has very definite advantages over present lamps, principal of which are: (1) forced ventilation is not required to cool it; (2) the eight-element biplane fila-



ment assures brighter screen illumination as there is less light lost in the optical system; (3) the filament float mounting assures a more rugged lamp; and, (4) the slightly larger bulb diameter assures satisfactory lamp life with very little light depreciation throughout its life.

Essential data on this lamp are: 300 watts, 115, 120, 125 volts; T-12 black top bulb; medium prefocus base; C-13D biplane filament 6.7 mm wide by 6.7 mm high; 25 hours life, 25 lumens per watt; 2 3/16 inches to light center, and 5 inches overall length.



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for so LITTLE

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Every projectionist should know the whys and wherefores of his projection room equipment. He should know what to do and what not to do when his equipment fails to function properly, and how to keep the show going until the service inspector arrives at the theatre. PROJECTIONISTS' SERVICE MANUAL is a complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only $3 per copy, postage prepaid.

Send for it Now! *Do Not Delay*

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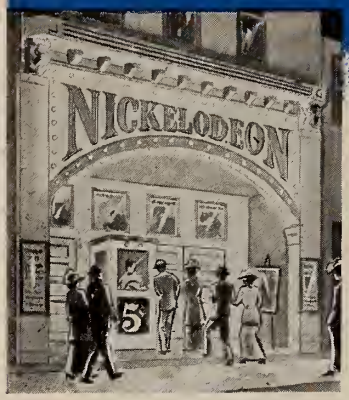
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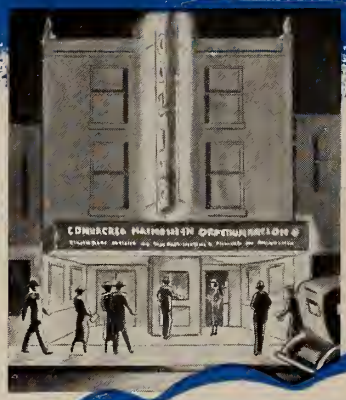
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More theatres equipped with *SIMPLEX* than any other projector.



1925 1935
More theatres equipped with *SIMPLEX* than any other projector.



1936 1946
More theatres equipped with *SIMPLEX* than any other projector.



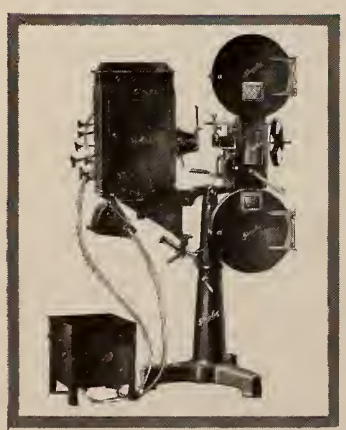
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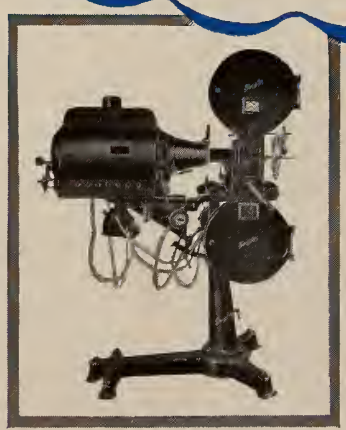
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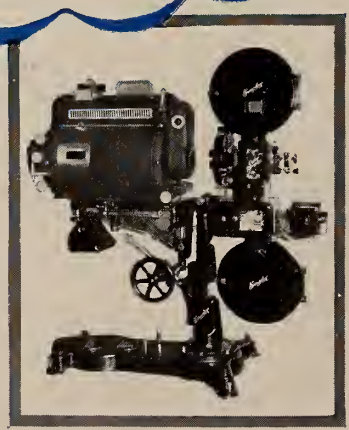
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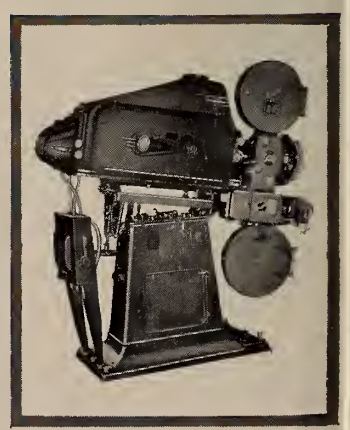
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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 22 AUGUST 1947 *Number* 8

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MONTHLY CHAT

SOMEHOW and soon the projection field will have to come to grips with the problem posed by the ever-increasing demand for more, and still more, light on the screen. Already acute in many of the larger theatres, some of which have gone to fantastic lengths to obtain more light, the problem will be compounded as the ratio of color films to black-and-white prints increases.

[Preliminary announcements indicate an increase of 25% in color feature releases for the 1947-48 season: 52 Technicolors, 13 Cinecolors, and 12 Trucolors, the latter, from Republic, all to be on acetate stock. Various series of shorts, including Magnacolor units, will round out the color schedule.]

Manufacturers of film stock, carbons, arc lamps and projectors are even now huddling and striving feverishly to effect some practical means for countering the inevitable deleterious results of the constantly-rising amperage level. Directly on the spot to take the brunt of the "beefs" certain to ensue as amperages go up are the film stock people, because their product itself is literally on the spot. Few projection people will stop to reason "why" the film buckles; they will be acutely conscious only of the fact that it does.

There are many angles (other than the projection) to this problem of adequate screen brightness. Many factors affect the final decision in a given situation, and practically every theatre is a special problem in itself. Pertinent factors warranting careful consideration include the physical characteristics of the auditorium, the type of lamp, the size of carbon, the optical setup, the screen size, the length of throw, accurate positioning of the lamp elements, *and the amperage.*

We italicize the last phrase because amperage is really the point of this little essay. I. P. has ever been the champion of adequate screen light, and we regard the present SMPE standard of $10 \mp \frac{1}{4}$ foot-lamberts as adequate for the vast majority of theatres. Moreover, we wish to make the following flat statement:

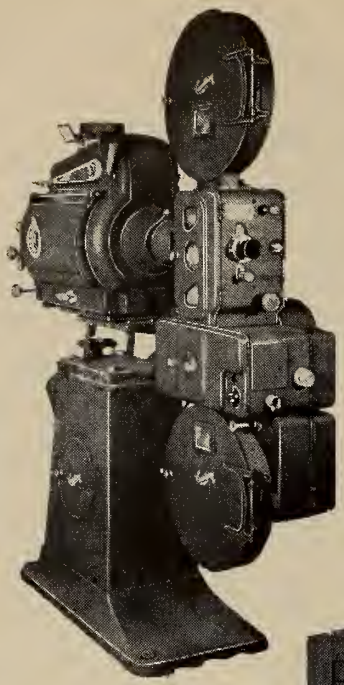
Increasing the amperage does not in itself assure an increase in screen illumination, particularly with respect to exceeding the manufacturers' ratings for both lamps and carbons.

In fact, increasing the amperage can be definitely harmful in many instances, resulting not infrequently in "washing out" the tone value of a picture, whether black-and-white or color, in the pencilling of the carbons and concomitant alteration in spectral characteristics, in damage to the mechanical parts of the lamphouse, in an increase in flicker, in excessive carbon consumption, and in a waste of current.

"What!" will likely be the exclamation of many a projectionist. "Do we understand you to say that we can ever

(*Continued on page* 38)

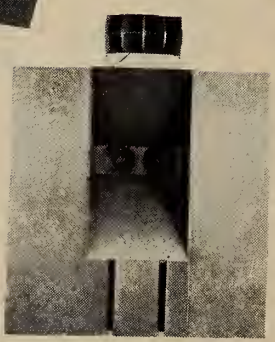
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VOLUME XXII AUGUST 1947 NUMBER 8

What Makes a Good Loudspeaker?

By R. S. LANIER
Western Electric Company

Here is the lowdown on the what, why and how of loudspeaker design and performance, as originally published in Western Electric Co.'s "Oscillator," a periodical published to help the well-informed become better informed.

WHAT IS high quality in a loudspeaker? As an electro-acoustic transducer, a loudspeaker radiates an acoustic wave-form equivalent to the electrical wave-form reaching it from the other components of the system. As the final element in a system for entertaining or informing a listener, a fine loudspeaker, given faithful reproduction and transmission in the preceding components of the system, projects music and speech which are faithful reproductions and therefore satisfying to the listener.

A poor loudspeaker will destroy the quality of the finest system, although a fine speaker cannot project sound of higher quality than that of the electrical signal reaching it. A fine loudspeaker is thus an essential link in the chain of high-quality reproduction.

These are simple statements of loudspeaker performance, but the achievement of such performance is a complex problem. An examination of the design objectives which guided the development of the new Western Electric loudspeakers, and the methods used to incorporate them in the speakers, will serve to illustrate the general principles of loudspeaker design and will give a clearer understanding of the advanced reproduction qualities of these new speakers. The most commonly accepted criteria for high quality loudspeaker development can be grouped under the following general headings:

1. A wide frequency range must be reproduced;

2. Uniformity of response over the range reproduced is extremely desirable;

3. All forms of distortion must be reduced to very low levels;

4. A high degree of damping is desirable for faithful reproduction of transients and to improve the linearity of the system;

5. Uniform distribution of energy over an appropriate angle is required;

6. The power capacity must be adequate to cover the peak powers expected.

Magnetizing speakers with a controlled pulse of energy produced in condenser discharge unit.



These qualities are all necessary for fine loudspeaker performance. Their application in a loudspeaker design is a difficult problem, because the human ear is a most particular and sensitive instrument, giving importance to many effects the engineer might overlook and often finds difficult to measure. Thus the designer of a fine loudspeaker must have full command of the electro-mechanical engineering art, and in addition, he needs a wide background of listening experience in order to interpret the actual subjective effect of various characteristics on the listener.

Frequency Response Data

Consider first the question of frequency response, undoubtedly the most discussed characteristic of loudspeaker design. No subject has been more beclouded and misunderstood than the rellative merits of various loudspeakers as expressed by frequency response curves.

Although a number of methods of measuring the frequency response of a loudspeaker are well understood in the industry, different methods are used by different manufacturers. In addition, it requires long experience to correlate curves taken under laboratory conditions with the subjective effect of the loudspeaker in a normal listening application.

Thus the sound technician—and even more the layman—should not attempt to interpret the performance of a loudspeaker *solely* from curves published to show its frequency response. Even when

published with the best of intentions, such curves are likely to be misleading as to what the ear is actually going to hear when the loudspeaker is installed. But, though frequency response curves do not tell a simple story considered alone, they are extremely valuable as aids to the experienced designer.

Response Curves as Design Tools

In the design of the new W. E. speakers, many carefully derived frequency response curves have been used as engineering tools to guide the development engineer.

Speech and music are composed chiefly of transient impulses, and many of the standing waves do not have time to occur. Furthermore, a listener, because of his binaural hearing, tends to average the pressure existing at two points, thus further minimizing the effect of reflections.

It is interesting to note, in this connection, that from 80 to 95% of the sound heard under average listening conditions is *reflected* sound, even if the listener is sitting near the axis of the loudspeaker—indicating the vital importance of the room characteristics in determining the "sound" of a loudspeaker.

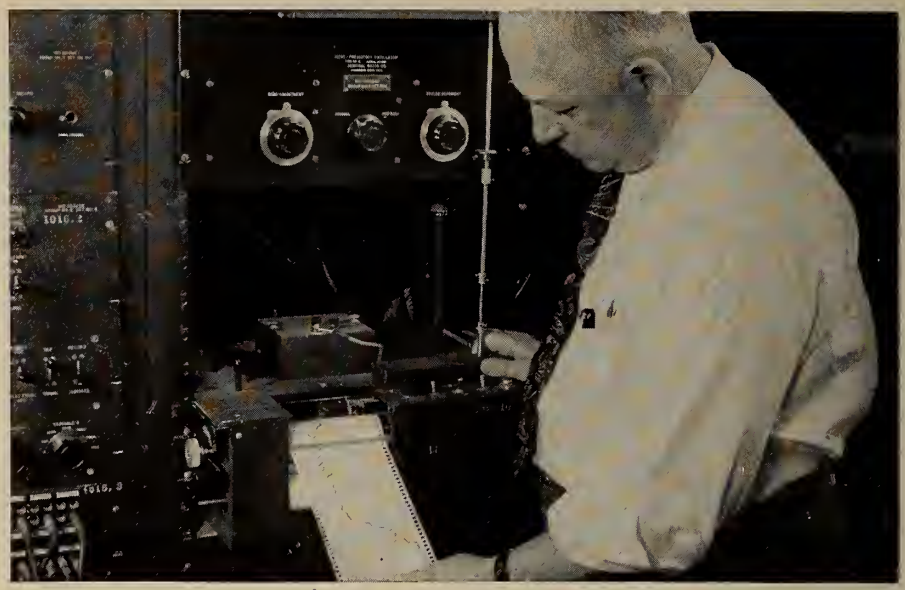
The over-all frequency response of the new W. E. speakers has been designed, with the actual effect on the ear as the final criterion, to combine all such factors into a smooth, wide-range response that would produce complete clarity and realism.

Interesting Listener Reaction

The success of the design has had in some cases a curious effect. Some listeners, used to the overbright, rather "harsh" quality of loudspeaker systems with a "peaky" high-frequency characteristic, and to the rather high noise level common in such systems, feel on first hearing them that the new speakers are lacking in high-frequency response. But they soon discover, with further listening, that the new speakers actually have a wider, smoother high-frequency range that produces high clarity and definition without the harshness of the "peaky" speaker; and that the reduction in extraneous noise—such as surface noise—is a real gain, not achieved at the expense of high-frequency response.

The same use of careful measurement together with reports from many experienced observers as to the subjective effects, was used to guide the engineer in producing a design with a very low level of all forms of distortion. The reduction of distortion to negligible levels in a direct radiator speaker is difficult, but it is important if the sound produced by the speaker is to give pleasure to the listener.

The listener "acceptance" of the new speakers, the fact that the listeners feel pleasantly relaxed when listening to them, is to a great extent a measure of the extremely low low distortion level achieved in the design.



Automatically-recorded graph showing frequency response of completed loudspeaker comes off the machine especially designed by W. E. to make this final quality test of the production process.

Winding unit produces uniform voice coils with each turn anchored permanently in position.



Factors in Low Distortion

Many factors contribute to this low distortion level. Some of the principal ones are:

1. The voice coil has been made large for excitation of the whole cone in a uniform manner;
2. The special "shallow cone" design minimizes the interference effects which normally occur at high frequencies in cones of steep section;
3. Edge damping, a feature of the new designs, reduces distortion caused by cone breakup by attenuating reflections from the edge. It improves the linearity of the mechanical system in general by providing damping in the bass where the air loading is low, reducing the bass resonance and producing a smoother response;
4. The shape and construction of the cone have been carefully selected for most desirable vibrational characteristics.

The mechanical characteristics of the new direct-radiator speakers were considered with the same care as the electrical, in order to be sure that the speakers would be fully applicable to use in all forms of sound reproduction systems. Thus the new "flat" cone design was attractive not only for its acoustic superiorities, but because it could be combined with a new magnet configuration to produce the unusually small front-to-back dimension of the new speakers.

The magnetic gap has been made somewhat wider than earlier standard practice would dictate, for increased stability and uniformity of characteristics over long periods of time under the most severe conditions of use. For improved efficiency a very large magnet of Alnico —weighing ten pounds in the 728B—has been incorporated in the new speakers.

Dual Channel Systems

In the design of the dual channel systems, special attention has been given to the choice of cross-over frequency, to the balancing of energy in the two channels, and to the relative positions, in the vertical and horizontal planes, of the low- and high-frequency speakers. A cross-over point of 800 to 1000 cycles has been chosen as indicated by careful listening tests as to the most effective design.

In the high-level systems, exponential

(*Continued on page* 30)



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Increased LIGHT for 16-mm PROJECTION†

E. J. ZAVESKY *and* W. W. LOZIER
Natianal Carbon Company

A new 6-mm experimental carbon makes it passible to project 2½ times as much light for 16-mm film as the present 6-mm 'Pearlex' high-intensity carbons. A 7-mm 'Suprex' carbon offers twice as much light as the 'Pearlex' and longer burning life than the 6-mm experimental carbon. Measurements af radiant energy intensity at the film aperture and spectral compositian are given.

THE greatly increased usage of 16-mm film during the past few years has advanced this particular phase of motion picture projection to a much more significant place in the industry than ever before.

The use of the small-size 16-mm picture aperture brings with it technical problems which require special attention. One of these problems is the task of providing adequate light for projection of the picture on the screen. The projection of a given amount of light through a 16-mm aperture requires approximately four-fold the concentration of radiant energy, compared with 35-mm film. Great concentration of light can come only from a source of high brightness.

Fortunately, the 6-mm "Pearlex" high-intensity carbon arc is available[1, 2] for this task and has proved a valuable tool in the projection of 16-mm film. Interest has been shown in still more powerful carbon arc sources. Therefore, attention will be directed in this article toward new developments and possibilities in such sources which will make available much greater amounts of light for this service.

Present 16-mm Carbon Arcs

At present, the carbon trim used for 16-mm film projection consists of 6-mm × 8½-in. "Pearlex" positive and 5.5-mm × 6-in. "Pearlex" negative carbons, operated at 30 amps and 28 volts at the arc. This trim, used in a projection system employing a 10¼-inch diameter F:1.6 mirror and a 2-inch focus untreated F:1.6 projection lens provides a total of 2300 screen lumens with no shutter, film or filters.

A previous paper[2] has shown that this amount of light is capable of illuminating screens of 75 per cent reflectivity of about 8-, 11.3- and 16-ft. width, respectively, to the maximum, optimum, and minimum brightness levels of 20, 10 and 5 foot-lamberts recommended for 16-mm film[3]. The recommended optimum brightness of 10 foot-lamberts is identical with the preferred value for viewing 35-mm film as specified by ASA Standard *Z-22.39*-1944.

"Pearlex" carbons also are designed to furnish a continuous burning time of 60 minutes at the above current and voltage, and have the color of the light adjusted toward the quality deemed desirable for the projection of Kodachrome.

Consideration has been given to carbon arc sources capable of properly illuminating screens considerably larger than presently possible in 16-mm projection.

Experimental work has led to the development of a new 6-mm positive carbon capable of operating at currents as high as 50 amps. A positive carbon of this type paired with a suitable 5.5-mm negative carbon and operated at 50 amps and 40 volts, provides 2½ times as many screen lumens as the present trim with identical F:1.6 optics. The significantly greater light output is attributable to a maximum crater brightness of 750 can-

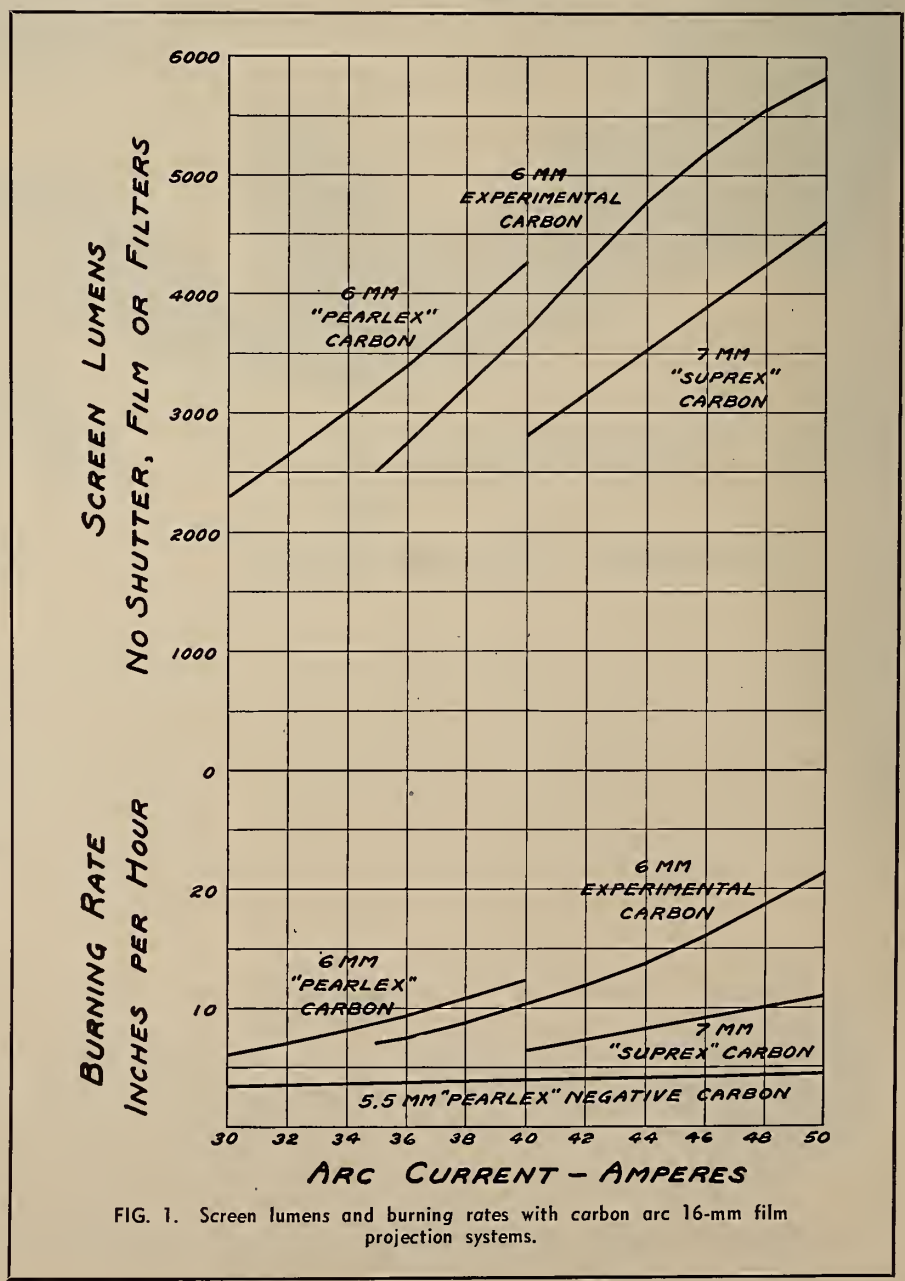


FIG. 1. Screen lumens and burning rates with carbon arc 16-mm film projection systems.

† J. Soc. Mot. Pict. Engr., May 1947, p. 447.

dles per sq mm compared with 350 candles per sq mm for the 30-amp "Pearlex" positive carbon.

In order to realize this great increase in light output, a positive carbon consumption of about 20 inches per hour is reached in comparison with 6 inches per hour for the present trim. An 8½-inch carbon thus has a life of only 15 to 20 minutes instead of 60 minutes.

Since this higher burning rate might limit the application of this trim, further work was conducted to relate light output and life at lower operating currents. In addition, the effect of using 7-mm positive rather than 6-mm positive carbons was investigated. "Suprex" positive carbons were considered for the 7-mm size.

Comparative screen light output and burning rates are shown in Fig. 1 for 6-mm "Pearlex," 6-mm experimental and 7-mm "Suprex" positive carbons at various currents. The screen lumen values were measured without shutter, film or filters using the F:1.6 optics previously described.

It is evident from Fig. 1 that the 6-mm experimental carbon at 50 amps gives the most light—5800 lumens compared to 2300 lumens for the standard "Pearlex" carbon at 30 amps. In cases where economy of power is of great concern, the 6-mm "Pearlex" carbons are to be preferred, for they give the most light in the lower current range.

If a long burning life is desired and increased power is not objectionable, the 7-mm "Suprex" carbon offers advantages. For example, to produce a screen light of 4600 lumens, the 7-mm "Suprex" carbon requires 50 amps and burns at the rate of 11 inches per hour, compared to 43 amps and 13 inches per hour with the 6-mm experimental carbon.

Application of New Sources

While it is evident from Fig. 1 that significant increases in light can be provided for the projection of 16-mm film, there are a number of factors incident to such increases which must be considered prior to any application of these systems. Among these is the time of continuous burning required. Shall this be 60 minutes, or shall it be 20 to 25 minutes, as is the practice for 35-mm film projection?

Also, there are questions of the color quality of the light needed for 16-mm film projection and of the effect on film of the radiant energy at the aperture.

The proper combination of light increase, screen size, and desirable continuous burning time involves a multitude of factors which cannot be resolved here. However, the physical factors such as length and size of carbons, and required lamps and mirrors and lenses, *etc.*, have a degree of flexibility which can be utilized to best advantage by the industry.

An example of some possibilities in respect to length of burning life is afforded by Fig. 2, where burning life of the positive carbons has been plotted against arc current.

It will be noted that one hour life can be obtained with the 8½-inch length carbon only at the lower limits of the indicated current ranges. The 7-mm "Suprex" carbon, 12 inches long, will give one hour life and 4200 lumens when operated at 48 amps. This represents an 80 per cent increase in light and the same life compared with the 6-mm "Pearlex" carbon at 30 amps.

The 6-mm experimental carbon, 12 inches long, operated at 50 amps provides 2½ times as much light and about one-half hour instead of one hour life.

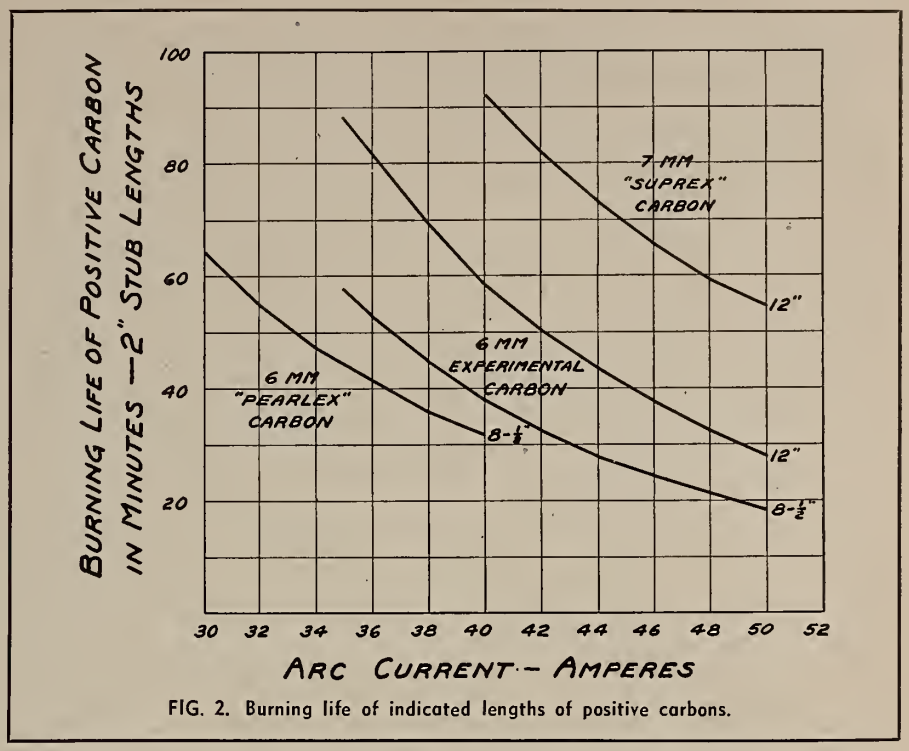


FIG. 2. Burning life of indicated lengths of positive carbons.

The 5800 lumens provided by the 6-mm experimental carbon at 50 amps is adequate to illuminate a 19-ft screen to the preferred 10 foot-lamberts value with a shutter having a 50 per cent transmission and without film or filters.

Radiant Energy Data

Measurements have been made of the radiant energy intensity at the center of the film aperture for the 6-mm "Pearlex" carbon at 30 amps and the 6-mm experimental and 7-mm "Suprex" carbons at 50 amps. The technique used was the same as described in previous articles[4].

The data in Table 1 give the radiant intensity in watts per sq mm incident at the center of the film aperture for the systems listed and also show the breakdown of the energy in various spectral bands. The wavelengths 6300 A, 11,250 A, and 42,000 A, are those appropriate to the filters used. In addition, the fraction of the total energy within the 4000 to 7000 A wavelength limits of the visible region has been calculated from combination with spectral energy distribution data in the visible.

The maximum intensity of 1.45 watts

(*Continued on page* 31)

TABLE 1: Radiant Energy Intensity at Center of Film Aperture.

Item	Carbons Positive	Carbons Negative	Arc Amp	Arc V	Lamp Optics	Watts per Sq Mm	Measured Per Cent of Total Below 6300 A	Measured Per Cent of Total 6300–11,250 A	Measured Per Cent of Total 11,250–42,000 A	Calculated Per Cent of Total (4000–7000A)
(*1*)	6-mm "Pearlex"	5.5-mm "Pearlex"	30	28	10¼-in. dia., *f*/1.6 mirror	0.90	27	35	38	33
(*2*)	6-mm Experimental	5.5-mm "Pearlex"	50	40	10¼-in. dia., *f*/1.6 mirror	1.45	37	32	31	45
(*3*)	7-mm "Suprex"	5.5-mm "Pearlex"	50	37	10¼-in. dia., *f*/1.6 mirror	1.10	39	33	28	48

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

II. THE WORK OF CASE AND de FOREST—1911-1924

THE RESULTS secured by the early workers were, by limitation of existing equipment, rather crude and did little more than demonstrate the principles of sound recording and reproduction. It was Theodore W. Case who, more than anyone else at this time, began to realize that, if sound pictures were to serve as a medium for entertainment, it would be necessary to perfect the system to such an extent that the illusion created in the reproduced sound and pictures be good enough to make one forget the mechanics of the system and think only of the event portrayed. Accordingly, in putting together the Case system each step was studied and developed with the idea of incorporating the best engineering practice available at the time.

The way was made easier because of the developments made during the first World War, including improved microphones, better vacuum tubes, amplifiers, loudspeakers, *etc.*

1911: Case began experimenting on sound recording while a student at Yale. In a letter to his mother, Jan. 22, 1911, he writes: "Most of my time now is taken up in experimenting with my Selenium Cell with the idea in mind of photographing sound waves and using the positives as records for a new kind of Phongraph or rather it would be called a Lithograph, I suppose."

And on Feb. 12, 1911, he writes: "Yesterday I at last succeeded in transmitting sound by light. I used the principle of the manometric flame. The eye could not detect the variation of the light at all but it was registered perfectly in the varying of the resistance of the selenium. The reproduction of the voice was perfect. Next, I have to set up an apparatus for my delicate photographing of the light variations. It is very interesting work and gives me something to do alright."

Case Laboratory Opened

1913: Case began experiments at Auburn, N. Y. and devoted himself to trying to find a practical means of converting light into electricity.

1916: E. I. Sponable, upon graduating from Cornell, joined Case and with him started the Case Research Laboratory. Case's experimental work was moved from the cellar of his home at 196 West Genessee St. to a new laboratory designed by Sponable and built at 205 West Genessee St. A three-stage audion amplifier was purchased from the de Forest company. This was used to test a large number of crystals and minerals for the property of changing resistance when illuminated. About 19 new substances were found and studied. It was at this time that Case first met de Forest.

1917: The "Thalofide" Cell (containing a light-sensitive change-of-resistance material similar to selenium but a form of thallium oxy-sulfide particularly sensitive to infrared radiation) was discovered (Fig. 2).[37] This was used as the receiving element in an infrared signal and communication system developed for and used by the Navy during the first World War.

During this time the Case Research Laboratory, working in conjunction with the Naval Experimental Station at New London, Conn., was entirely devoted to war work and carried on extensive research in the transmission and amplification of speech and signals in connection with its infrared system.

Barium P.E. Cell Developed

1918 to 1922: De Forest began work on talking motion pictures. He filed patent applications on methods of recording in 1919, and during 1922 carried on experiments in Germany trying to record sound by modulating a high-frequency gas discharge tube.[38]

1920 to 1922: Case discovered the barium photoelectric cell and began its development.[39] In its final form it was used in a recorder for making permanent records of the light variations of daylight and sunlight.

1920: De Forest purchased Thalofide Cells from the Case Research Laboratory.

Oct. 1922: Case saw de Forest in New York regarding extraneous noises in Thalofide Cells that de Forest was trying to use for reproducing sound.

Oct. 1922: Case, while in London, witnessed a demonstration of Rankine's experiments in sound recording.

Nov. 1922: Upon his return from abroad, Case was invited by de Forest to visit his studio. De Forest spoke of trouble he was having in trying to record sound with high-frequency discharge tubes. He exhibited and reproduced a short piece of sound film. This was barely understandable.

He apparently was about at the stage he speaks of in his SMPE article[40]—"I well remember the grim satisfaction I felt when, for the first time in reproducing a photographic record of my voice, I was able clearly to determine whether or not it was being run backwards!"

Nov. 1922: A crude sound camera was made at the Case Laboratory and a sound picture made of a modulated oxy-acetylene flame. This was the same manometric flame that had previously been developed for use in infrared telephony.

Case-de Forest Relations

De Forest at this time tried recording with tungsten filament lamps with practically no success. Case suggested to him the use of a hydrogen-filled lamp as having faster reaction. The Case Laboratory made up several hydrogen-filled flashlight lamps for de Forest, and also tried some of them for sound recording using a four-stage amplifier. The results were poor because of the large amount of unmodulated light.

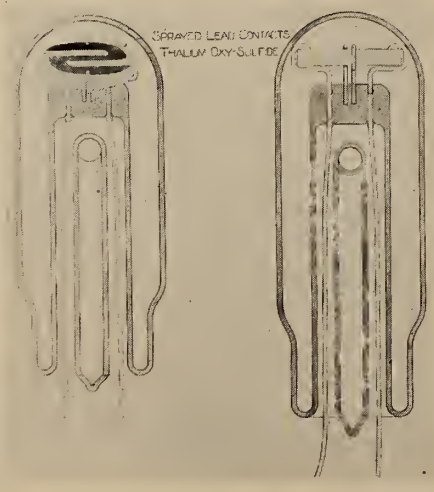
Dec. 1922: De Forest's relations with Case are indicated in the following excerpt from a letter from de Forest to Case:

"As per our telephone conversation I am mailing you today six blanks, two of each capillary diameter. Kindly fill these with nitrogen and exhaust as soft as possible, *i. e.* to give them maximum brilliancy and minimum voltage. Paint with bronze the two balls at each end of the tube and wrap same carefully with tinfoil and glass. Then apply to these terminals alternating high voltage.

"I hope you can get these tubes to light up at 3000 or 4000 volts. You might put in a needle spark gap in shunt as approximate voltage indicator.

"I suggest that you put a drop of mercury in some of these tubes to see if this does not considerably soften the discharge, at least when the tubes get hot enough to liberate the mercury. I am also requiring you to be so good as to make up two or three ballast resistances

FIG. 2. Thalofide Cell, high vacuum, helium- and hydrogen-filled. Case Research Laboratory, Auburn, N. Y., 1917.



† J. Soc. Mot. Pict. Eng., April. 1947, p. 275

[36] Der Sprechende Film Mihaly (1928).
[37] U. S. patent Nos. 1,301,227; 1,316,354.
[38] U. S. patent No. 1,466,750.
[39] Case, *Jour. Opt. Soc.* (1918).
[40] *Trans. SMPE, 16* (1922), p. 62.



Simplex HIGH

PROJECTION ARC LAMP

The most economical source of abundant screen illumination from any standpoint

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using very fine tungsten filament and hydrogen gas. Believe that the bulb lamps are usually filled with hydrogen at atmospheric pressure, but am not informed on this point.

"I believe if I can get a proper ballast system in series with the short filament lamp I can record the voice photographically by this means. This, of course, is an ideally simple matter compared with the high-frequency light.

"I shall await receipt of these tubes and your further suggestions with great interest."

The Famous 'Aeo' Light

1922: Case found that the gas discharge in an argon-filled vacuum tube whose filament was coated with alkaline earth oxides could be easily modulated at a low voltage, and it seemed to Case suitable for sound recording purposes. This tube had been previously used in his infrared signal system. This observation led to the development of the Aeo light and was a big step in making this system of sound recording practical.

Previous to this discovery by Case, de Forest had been using nitrogen-filled tubes operating on a high-frequency circuit at 3000 to 4000 volts and giving a very limited photographic light output. The Aeo light operated on d-c at 200 to 400 volts and gave off radiation which was highly actinic. (Fig. 3 shows Aeo light as finally developed in 1928.)

1922: A Powers projector was converted into a sound camera at the Case Laboratory. Also, the Aeo light was improved by using helium gas instead of argon, thus increasing its actinic light. Soon it was found that these recording lights could be operated without heating their cathodes.

The following abstracts from the Case Research Laboratory records indicate the stages in the development of sound recording during the period from 1923 to 1925, inclusive:

Jan. 10, 1923: A conference was held among Case, Sponable, and Thompson (patent attorney for Case) to discuss the patentability of Helio light (later named Aeo light).[41]

Jan. 11, 1923: It was found that non-oxide coated filaments in vacuum tubes were not good for sound recording and that a cathode discharge was more desirable.

Jan. 13, 1923: Case wrote to de Forest telling him oxides in the recording lights effected an improvement when the filaments were operated cold. Later it was found that this oxide coating was photo-active.

Jan. 26, 1923: A letter was received by Case from de Forest about the lights containing oxides. It also mentioned trying two small ball electrodes, oxide-coated. This proved impractical because the area was not great enough on small ball electrodes and an arc discharge started too easily.

Feb. 10, 1923: Case suggested to de Forest that he remove the lens from the Helio light system to get rid of "blasting" he had been getting.

Feb. 14, 1923: A new sound camera designed by Sponable and built by the Precision Machine Co. of New York was completed and first tested. Sound records were made with good results.

Feb. 23, 1923: Case and Sponable visited the de Forest studio in New York. De Forest's first combination of pictures with sound was seen and heard. These

(*Continued on page* 32)

[41] U. S. patent No. 1,816,825.

FIG. 3. Present type of Aeo light. Case Research Laboratory, Auburn, N. Y., July, 1928.

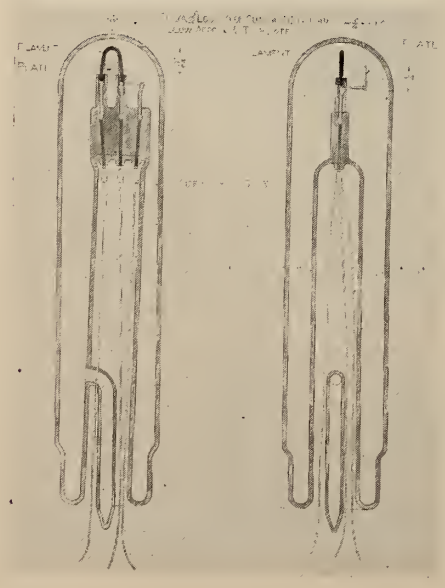


FIG. 4. The first Case sound-on-film newsreel outfit, used in 1924 to interview the then President Coolidge and Senator Robert F. La Follette, Sr. This was the first newsreel recording of any importance.



RADIO NEWS, NOV. 1924

Trucolor Only Acetate Releases 'til 1948; Splicing and Focusing Data

EXTENSIVE investigation by I. P. during the past month turned up certain facts which alter substantially the picture with respect to the early introduction of acetate release prints on a wide scale. It appears also that those rumblings from the field anent the difficulty of splicing and focusing acetate prints were the result of indecision as to proper procedure and suitable facilities.

It has been established definitely that neither Magnacolor nor Cinecolor prints have heretofore been on acetate stock, and film manufacturers advise that so meager is the supply of acetate film at present that practically the entire output until well into 1948 will go into the production of Trucolor (Republic) feature releases. Thus, projectionists need be on the alert in terms of special handling only for Trucolor prints for at least the balance of this year.

It is possible, of course, that a few random short reels printed on acetate stock will reach some projection rooms; but Eastman Kodak Co. advises that until 1948 there will be insufficient acetate stock for other than Trucolor prints to enable the normal national release of even one short—usually about 150 prints at most.

Increased Production Planned

This is no indication that there will be any lag in the drive to substitute acetate for nitrate film in all release prints, cautions Eastman. On the contrary, efforts to effect the switch are proceeding apace, and will be intensified, but the shortage of acetate production equipment and certain other factors relating to studio and laboratory technique and equipment will necessitate a gradual changeover in film base. Mid-1948 is the Eastman estimate of the date for a noticable increase in acetate release prints.

Representative of craft opinion gener-

(*Continued on page* 35)





Guardian of her most important "bath"...

COSTLY shots like this might be so much spoiled footage . . . save for the vigilance and knowledge of the laboratory man.

He makes sure that the dailies take *their* all-important bath . . . inspecting, testing, keeping constant check as the exposed footage runs through the developing, fixing, and washing tanks and driers.

To his skill and watchfulness . . . as film representing "box-office gold" literally slips through his careful fingers . . . motion pictures owe much of their well-earned reputation for technical excellence.

This skill is more effective . . . the burden of constant vigilance lessened . . . when he works with dependable film of superior quality. That's why he always welcomes the family of Eastman motion picture films.

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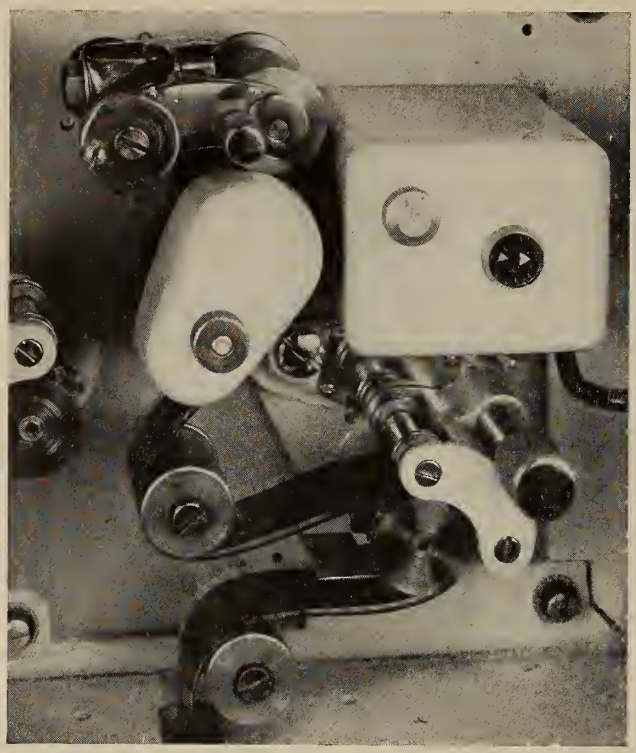


FIG. 9. Showing the threading path in the soundhead of the new DeVry '12,000' projector.

Soundhead, projector base and change-over unit are described in this second article of a series concerning the new

DeVRY '12,000' SERIES 35-MM SOUND-FILM PROJECTOR

By E. W. D'ARCY
Chief Engineer, DeVry Corp.

THE soundhead portion of the DeVry "12,000" series projector is built around an internally stabilized flywheel filter system utilizing a coupling fluid relatively uniform in its performance over wide variations of temperature. This rotary stabilizer functions in conjunction with the film loops as established for its correct operation so effectively as to reduce speed variations or flutter to less than 0.25% of the mean operating speed.

The mass weight and the weight ratio between the shell and its internal inertia wheel is such as to allow full stability of filtering to be reached in less than five seconds. In explanation of its filter performance, the film is isolated from intermittent sprocket fluctuations by a combined isolation and feed sprocket feeding the film to the sound drum, with its associated scanning components. The holdback sprocket for the takeup reel serves a dual purpose as the sound sprocket.

The film path between this combined sound and takeup sprocket passes around an idler roller in such a manner as to form two film spring elements of great effectiveness in increasing filter efficiency. The entire bearing assembly for the sound drum and flywheel combines into a readily replaceable unit featuring again rapid equipment serviceability. Fig. 9 illustrates the compactness and field serviceability of the entire assembly.

Film lateral adjustment is obtained by movement of the pressure pad roller holding the film in secure contact with the sound drum laterally and providing a means to secure this adjustment permanently by a locking screw. The pad roller additionally is supported on conical bearings which guarantee long life, a low frictional impedance, and low mechanical noise factor.

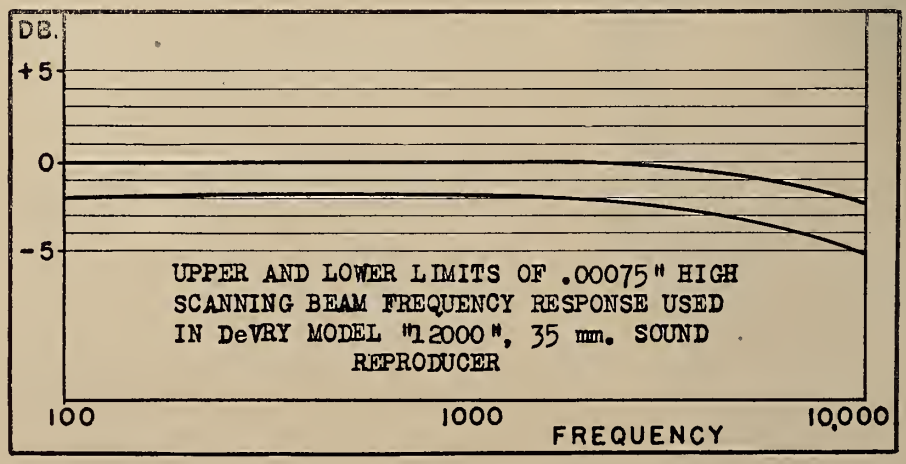
An additional adjustment is supplied in the pad roller bracket assembly for adjusting the tension upholding the film on the sound drum in such a manner that a component of force exists forcing the film to guide against the sound track side of the pad roller flange. This eliminates the necessity for splitting the pad roller and applying direct pressure to the film for guiding.

The sound optical system is of a type utilizing a cylindrical reduction lens system with the photoelectric cell located inside of the sound drum. This allows full use of all of the illumination transmitted through the film and eliminates the necessity for condensers or mirrors between the film and photocell. Fig. 9 shows the location of the components.

A 6-volt, 1-ampere lamp of prefocus type is utilized for the light source and is held in fixed relationship to the cylindrical reduction lens system. It eliminates exciter alignment problems and guarantees rapid, correctly registered replacement of lamps in case of burnouts.

The cylindrical reduction lens system is adjustable from the front of the projector mechanism both as to focus and

FIGURE 10



RCA's stage loudspeaker system

. . . a sound box-office attraction



For the pleasing and realistic tone balance that pays off at the box office—choose an RCA Stage Loudspeaker System.

It reproduces voices, music and sound effects so clear and lifelike . . . distributes the sound so uniformly throughout the theatre auditorium . . . patrons enjoy an emotional reaction as though they were listening to an original studio performance.

HIGH-FREQUENCY LOUDSPEAKER

The cellular horn consists of small, scientifically correct, straight-axis horns coupled to a common throat. Choice of 12-, 15-, or 18-cell construction enables you to select the horn best fitted to minimize acoustical troubles due to shape of your auditorium. High-frequency mechanisms reproduce faithfully the very highest notes to achieve lifelike realism.

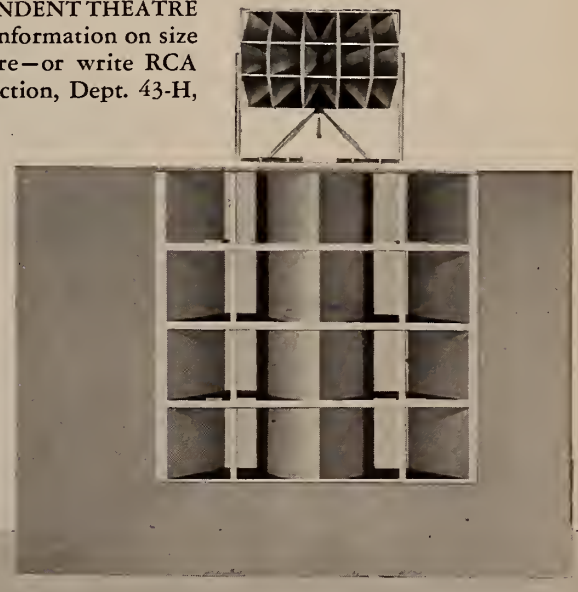
LOW-FREQUENCY LOUDSPEAKER

A massive horn provides well-rounded bass reproduction. Highly efficient oversize mechanisms reproduce the lowest tones that delight theatre patrons. A minimum of depth behind the screen is required for installation.

• • •

RCA Stage Loudspeaker Systems have won for themselves the respect and praise of theatre owners and operators all over the world. There is an RCA Stage Loudspeaker System that will bring Academy standards of performance to your theatre.

See your RCA INDEPENDENT THEATRE SUPPLY DEALER for information on size needed for your theatre—or write RCA Theatre Equipment Section, Dept. 43-H, Camden, N. J.



• • • • • RCA's big, two-way, de luxe Loudspeaker System for the medium-sized theatre.

This RCA heavy-duty de luxe Loudspeaker System is acoustically and electrically designed for use in theatres of 3000 and up in seating capacity.

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Brenkert Projectors
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RCA Tube-Type Rectifiers
Westinghouse Copper-Oxide Rectifiers
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Mohawk Carpets
International Chairs
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THEATRE EQUIPMENT

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

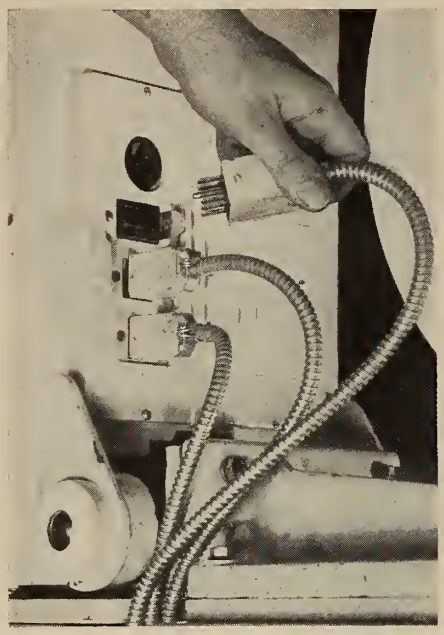


FIG. 11. Showing centralized plug-in wiring system in projector base.

azimuth. As may be seen, all mechanical parts, slit system, photocell and exciter lamps are readily accessible from the front of the projector for replacement or inspection.

The photocell used is of the type CE25 and is protected from electrical disturbances by adequate shielding. The photocell wires are led to the outside of the projector case by a low-capacitance neoprene type cable, where it terminates in either a preamplifier or, in some cases, to an extension cable for the wall-type of amplifier.

In performance, the optics allow the recommended Academy of M. P. Arts & Sciences curve to be produced with a noise level, projector operating, of less than 60 db below normal operating power level. A frequency response curve illustrating the over-all performance of the soundhead is shown in Fig. 10. This curve is of slit performance alone and illustrates the frequency response obtainable with the cylindrical reduction lens system.

Projector Base Data

The projector base supplied as standard with the "12000" series equipment is available in either the table-training or non-training types. It consists essentially of a welded frame to which front and rear mounting base castings are attached. The center of gravity and weight is so adjusted that a balance point for the completely assembled projector falls behind the table pivot bar and underneath the arc lamp.

Adjustment of the projector as to azimuth is obtained by a hand wheel mounted inside the base frame and is accessible by removal of a side panel. Bases are locked in operating position by two hand wheels on either side of the base main frame, locking into the table apron, which extends downward in the mechanism frame housing. The table consists of a front and rear casting of adequate section and is available in both training and non-training types. The arc, rectifier starting switch and carbon respository are mounted in the rear of the base.

All wiring is brought to a terminal box located in the front of the base, which is accessible by the removal of its cover plate (Fig. 11). A trouble light outlet receptacle is mounted directly below the terminal box. Plugs are mounted in the mechanism base, facilitating rapid disconnection of the projector head itself.

The front table casting is removable from the rear table by bolts, and other front tables are supplied meeting various conditions of projector base usage. The base is four-point leveling, and when levelled is held to the projection floor by expansion bolts, *etc.*, which are spotted through the leveling screws themselves.

The exciter lamp supply is mounted in the base itself and consists of a selenium rectifier unit, rapidly replaceable, with good regulation and low ripple content.

Changeovers supplied with the projector head are of the "Zipper" type; they may be operated manually from either side of the projector for emergency usage in case of solenoid failure. Projector heads are so wired that no master projector is required and straightforward conventional changeover wiring is used, with the exciter lamps being utilized for the sound changeover, and with photocell outputs and preamplifiers being in an operating condition at all times. Facilities are available in the base terminal box for the attachment of floor foot-switches in case that should be preferred over the press-button available in the projector head.

[NOTE: Complete data anent the "12,000" series amplifiers and speakers will appear in an early issue.—ED.]

LETTERS TO THE EDITOR

To the Editor of I.P.:

Regarding Mr. Benson's contribution to the discussion of acetate film stock in your July issue†: I can't see Benson's point of view with respect to the doleful happenings if he had not had his own acetate cement on hand. All he need have done was to insert a piece of blank nitrate film at the break, as acetate will bind to nitrate with regular cement.

I have been a projectionist for 40 years, and it would take more than a film break to stop my show. If I am running an acetate print and a few patches come apart, I cut about four frames of nitrate film and splice the acetate to it—*using ordinary cement.* I haven't had a patch pull loose on me yet. If no blank film be available, snip a piece from the tail end of a short or any other subject you have on hand—anything to keep the show going.

FRED LUNDY

Brentwood Theatre, Jacksonville, Fla.

Indicating that our British brethern are also having difficulty with acetate prints is the appended representative communication from a projectionist to *Ideal Kinema*, film trade paper:

"Before the recent run of a Magnacolor print we received a card from the renters stating that the only solution which would stick this kind of print was glacial acetic acid. Upon examining the print I found that although the projectionist on the prior run had scraped *both* surfaces, each splice came apart at the slightest pressure. The suggested splicing solution was useless, as was ordinary cement.

"However, after trying unsuccessfully for 20 minutes to splice this film, I tried inserting a frame of white spacing between each splice. This did the trick, and we ran the print without trouble. The white spacing, of course, does occasion a flash on the screen, but this is preferable to a blank screen resulting from a splice coming apart.

"We ran numerous acetate prints during the war. They always created a terrific noise and it was difficult to maintain a steady image on the screen. The Magnacolor print behaved in exactly the same way, and it struck me that perhaps it was printed on a safety base."

An opposing view is taken by another *I. K.* subscriber, even when using regular cement:

"After scraping I always roughen the film with a strip of fine glass-paper. The splicing of acetate film is not a major operation: the point to remember is that the film should be scraped *dry*, that is, without moistening the film."

The *I. K.* also offers a formula for acetate film cement submitted by a "leading sub-standard film worker":

Acetone	20 cc.
Chloroform	4 cc.
Glacial Acetic Acid	2 cc.

Dissolve into this 2 in. clean 16 mm. base. Do not keep in metal cans; use a stoppered bottle. Keep brushes separate from those used for normal cement.

To the Editor of I.P.:

Two Roy Rogers features (Republic's Trucolor) and several other 35-mm features and shorts have proven the new

(*Continued on page* 37)

† "Letters to the Editor," I. P. for July, 1947, p. 19.



Focus on the future

MORE and more in the months ahead, your theatre grosses will depend on the high quality of sound that your sound system beams to the ears of your patrons—ears constantly becoming more critical and discriminating.

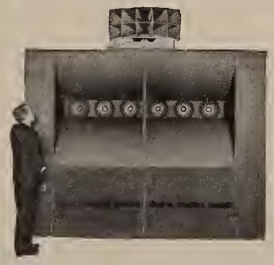
More and more, your box office will depend on the *high quality of sound service:* it will depend on the progressive Altec development of tested methods to make your equipment *keep pace* with the improvements on the way—and there are still more coming up!

For this high-calibre, *unbiased,* "eye-on-the-future" service, more theatres depend on Altec than on any other service organization in America.

Because Altec Service is nationwide, there is an Altec Service man ready to roll up his sleeves and go to work now, in *your* theatre, *wherever* in America it is located.

Altec Lansing "Voice of the Theatre" Speaker Systems

are the choice of major first-run houses throughout the United States; they now are in the review rooms of all the producing studios; they are already installed in theatres of all seating capacities where exhibitors insist on the finest quality of reproduction that money can buy. America's leading electrical engineers consider Altec Lansing "Voice of the Theatre" Speaker Systems clearly above comparison with any other speaker systems on the market. See your dealer or Altec representative for complete information.



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CHANGE TO ALTEC SERVICE . . . . . A CHANGE FOR THE BETTER

New Kolograph Sound-Film Projector

A NEW 16-mm sound film projector is now in production by the Kolograph Corp., 233 West Maryland St., Indianapolis, Ind. The president of the firm, Lawrence D. Kohlmeyer, is no newcomer to the projection field, having built the first 35-mm sound projector for Dr. Lee de Forest.

The Kolograph intermittent, which runs silently completely immersed in oil, is guaranteed for life against all defects and wear, with special emphasis of design having been placed on the avoidance of most film wear and torn sprocket holes. Special development of the cooling system permits the use of a 1250-watt lamp without damaging the film or causing appearance of the well-known "doorknob" on the globe. The use of this lamp provides greater illumination over an enlarged screen area.

Designed for use from either 117-volt a-c or d-c source, the projector features a 2" coated lens, F:1.6 as standard equipment, but the lens mount will accommodate any other type or size. Sprockets are easily changed in the new Kolograph, a simple screwdriver being the only tool required. The condenser system is especially designed with a larger diameter than has ever been used in 16-mm work. The metal reflector is non-crackable.

The take-up is of the dual ball-bearing type. Frequent program interruptions are avoided because the unit will accommodate 22-inch reels holding up to 4400 feet of film, or the equivalent of about two hours continuous running time. The exciter lamp is d-c-powered by selenium-rectified a-c, and no resort is made to oscillators which are likely to get out of adjustment.

The lens mount is hinged, making it easy to clean the aperture, and the framing lever moves the entire optical system, thus avoiding the picture "jumping" off the screen when the film is reframed. The usual tilting mechanism is furnished.

Advanced Amplifier Design

The audio amplifier employs six tubes in a special trouble- and distortion-free circuit of superior stability. The response curve of the amplifier is substantially flat within ½ db from 30 through 9,000 cycles, thus assuring that the most exacting musical passages will be reproduced with complete fidelity. A powerful, 15-watt, 12-inch permanent magnet loudspeaker provided with the new Alnico 5 magnet is standard equipment. It requires no external a-c power source and is connected to the amplifier through two low-impedance, no-hum pickup lines. Provision has been made for the connection of two or more speakers to a single amplifier should greater coverage be desired.

An input for almost any type of microphone (other than a carbon or velocity) is furnished. The microphone lines are operated at low impedance, preventing the pickup of stray hum and permitting cable lengths to exceed 100 or more feet. Normally with other comparable projectors, a high-impedance microphone line is used which limits the cable length to about 20 feet and permits the stray pickup of occasional hum. The microphone may be used simultaneously with sound-on-film in the Kolograph because of the separate audio input channels built into the amplifier.



Operoting side. Note handy controls.

The large T-20 bulb, with a life of more than 2½ times that of the smaller T-12, may be employed without fear of overheating, and conditions of low or exceptionally high line voltage do not affect the photo-cell because of the use of rectified rather than oscillatory current.

A special tone control is provided which incorporates a "high-low" filter together with a bass boost rather than the more common and somewhat unsatisfactory potentiometer-condenser arrangement. The filter type of tone control permits complete regulation in the type of sound, while the smooth action of the volume control circuit provides any degree of volume from a mere whisper to a roar.

The amplifier and its associated equpment may be used separately from the projector as a public address system; and the projector will accommodate silent as well as sound films with proper film speeds available for both types. The film feed through the projector is of the "straight type" usually associated with 35-mm trouble-free theatre operation.

The unit is entirely portable, built into two cases of which one contains the projector, the other the loudspeaker. Both are finished in a fine grade of top leather, while the loudspeaker cabinet part is lined with special material for enhancing sound production. Complete literature and cables together with microphone and desk-stand are included.

Don B. Oliver, well-known figure in the 16-mm projector field, is handling national sales distribution at 188 West Randolph Street, Chicago 1.

Quality leather cases contain the complete Kolograph sound-film projection equipment.





I am AMERICA'S AVERAGE EXHIBITOR



- MY THEATRE SEATS 617
- I PLAY TO 822 PEOPLE A DAY
- I TAKE IN $224.41 DAILY, AFTER TAX
- I HAVE HIGH INTENSITY PROJECTION
- I BUY PROJECTION LAMPS MADE BY..

THE STRONG ELECTRIC CORPORATION

WORLD'S LARGEST MANUFACTURER OF PROJECTION ARC LAMPS

TOLEDO 2, OHIO

When the lamps are **STRONG** *the picture is bright!*

Projection Data Charts

By *ROBERT ALLEN MITCHELL*

FORM 4-B SOUND SYSTEM DATA

3. SOUNDHEADS

Number of soundheads _____
Make & model _____

Serial Nos.:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Are projector drive motors part of soundhead assembly? _____

Exciting Lamps:
Type No. _____
Volts _____
Current, amps. _____
A.C. or D.C. _____
If turret sockets are used, number of lamps per soundhead _____

Optical Units:
Make & model _____
Specifications _____

Photoelectric Cells:
Type No. _____
Optimum polarizing voltage _____
Remarks _____

4. AUXILIARY APPARATUS

Synchronous Disc Reproducers:
Number of units _____
Make & model turntable drives _____

Serial Nos. turntable drives:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Speed of turntables _____

How connected with amplifiers _____

Remarks _____

5. SPEAKERS AND CABLES

Stage speakers:
Number of stage speakers _____
Are all identical, or is wide-range system used? _____

Make & model speakers:
Speaker 1 _____
Speaker 2 _____
Speaker 3 _____

Made & model wide-range speakers:
Intermediate 1 _____
Intermediate 2 _____
Woofer 1 _____
Woofer 2 _____
Tweeter 1 _____
Tweeter 2 _____
Details of wide-range band filters _____

Speaker baffles, directional or flat. (State if speakers are exponential horns.) _____

How are fields supplied? _____

Voice-coil impedances:
Speaker 1 _____
Speaker 2 _____

Fuses: Type _____
Rating _____
Location _____

If amplifier is controlled separately from rectifier:
Are there separate switches for filaments and plates? _____

Types of switches _____

Location _____

Fuses: Type _____
Rating _____

Location _____

If exciters are turned on by separate switches:
Types of switches _____

Location _____

Fuses: Type _____
Rating _____

Location _____

Speaker field switches and fuses:
Types of switches _____
Location _____

Fuses: Type _____
Rating _____

Location _____

Safety door switches:
Location _____
Type _____
Control what _____

Miscellaneous switches and fuses:

Remarks _____

Fader Switches, Volume & Tone Controls:
Faders:
Make & type _____

Remarks _____

Meters:
Line (power input) Voltmeters:
Make & model _____
Number of voltmeters _____
Normal reading (A.C. or D.C.) _____

Where located _____

Rectifier Output Meters.

Voltmeters:
Make & model _____
Number per rectifier _____
Normal reading _____
Where located _____

Ammeters:
Make & model _____
Number per rectifier _____
Normal reading _____
Where located _____

Amplifier Meters.

Filament voltmeters:
Make & model _____
Number per channel _____
Normal reading _____
Where located _____

Filament ammeters:
Make & model _____
Number per channel _____
Normal reading _____
Where located _____

Amplifier Plate Current Milliammeters:

First stage:
Make & model _____
Normal reading _____
Location _____

Second stage:
Make & model _____
Normal reading _____
Location _____

Third stage:
Make & model _____
Normal reading _____
Location _____

Fourth stage:

Serial Nos. pickups:
Proj. 1
Proj. 2
Proj. 3

Non-synchronous Disc Reproducers or Phonographs:
Number of units
Make & model turntable drives

Serial Nos. turntable drives:
Non-sync. 1
Non-sync. 2
Non-sync. 3
Speed of turntables
Type pickups
Make & model pickups

Serial Nos. pickups:
Non-sync. 1
Non-sync. 2
Non-sync. 3
How connected with amplifiers

Film Phonographs or Dummy Soundheads:
Number of units
Make & model
Synchronous with which projectors

Serial Nos.

Specifications:
Exciters
Optical units
Photoelectric cells
Drives

Microphones:
Number of mikes in room
Type
Make & model
Serial Nos.

How are speakers flown for stage presentations?

Monitors:
Number of monitors
Where located

Type:
Monitor 1
Monitor 2

Make & model:
Monitor 1
Monitor 2
How are fields supplied? (If PM, so state.)

Voice-coil impedances:
Monitor 1
Monitor 2

Transmission line:
Length of line from booth to stage

Type cable
Switches or speaker plug-boxes backstage

Remarks

6. CONTROLS & METERS

Switches:
If more than one unit of sound system is controlled by one main on-off switch:
Type of switch
What it controls

Location

Fuses: Type
Rating
Location

If rectifier circuit is controlled separately:
Type of switch
Location

Are faders in amplifier cabinets?

How operated (Give specifications of relays or potentiometer faders.)

Are faders synchronized with changeovers?
Specifications of automatic changeover-faders

Volume (gain) Controls:
Make & type (If potentiometer fader, so state.)

Is volume control in amplifier cabinet?
Remotely controlled volume controls:
Type and location

How is volume control connected in system?

Tone Controls:
Make & type

Is tone control in amplifier cabinet?

Speaker Switches:
Stage Speaker Switches:
Type and specifications

Where located

Monitor Switches:
Type and specifications

Monitor Volume Control

Where located

Location
Subsequent stages. (see remarks at end.)

Photocell Polarizing Current voltmeter:
Make and model
Number of voltmeters
Optimum reading
Where located

Exciter Current Meters.

Voltmeters:
Make & model
Number of voltmeters
Normal reading (A.C. or D.C.)

Where located

Ammeters:
Make & model
Number of ammeters
Normal reading (A.C. or D.C.)

Where located

System output volume - indicator meter:
Make & model
Specifications

Remarks

Panel and Pilot Lights:
Type
Number
Location
Type
Number
Location
Type
Number
Location
Remarks

7. MISCELLANEOUS APPARATUS

Projection Data Charts

By ROBERT ALLEN MITCHELL

FORM 4-B SOUND SYSTEM DATA

3. SOUNDHEADS

Number of soundheads _____
Make & model _____

Serial Nos.:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____

Are projector drive motors part of soundhead assembly? _____

Exciting Lamps:
Type No. _____
Volts _____
Current, amps. _____
A.C. or D.C. _____
If turret sockets are used, number of lamps per soundhead _____

Optical Units:
Make & model _____
Specifications _____

Photoelectric Cells:
Type No. _____
Optimum polarizing voltage _____
Remarks _____

4. AUXILIARY APPARATUS

Synchronous Disc Reproducers:
Number of units _____
Make & model turntable drives _____

Serial Nos. turntable drives:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Speed of turntables _____
Type pickups _____
Make & model pickups _____

Serial Nos. pickups:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____

Non-synchronous Disc Reproducers or Phonographs:
Number of units _____
Make & model turntable drives _____

Serial Nos. turntable drives:
Non-sync. 1 _____
Non-sync. 2 _____
Non-sync. 3 _____
Speed of turntables _____
Type pickups _____
Make & model pickups _____

Serial Nos. pickups:
Non-sync. 1 _____
Non-sync. 2 _____
Non-sync. 3 _____
How connected with amplifiers _____

Film Phonographs or Dummy Soundheads:
Number of units _____
Make & model _____
Synchronous with which projectors _____

Serial Nos. _____

Specifications:
Exciters _____
Optical units _____
Photoelectric cells _____
Drives _____

Microphones:
Number of mikes in room _____
Type _____
Make & model _____
Serial Nos. _____
How connected with amplifiers _____

Remarks _____

5. SPEAKERS AND CABLES

Stage speakers:
Number of stage speakers _____
Are all identical, or is wide-range system used? _____

Make & model speakers:
Speaker 1 _____
Speaker 2 _____
Speaker 3 _____

Made & model wide-range speakers:
Intermediate 1 _____
Intermediate 2 _____
Woofer 1 _____
Woofer 2 _____
Tweeter 1 _____
Tweeter 2 _____
Details of wide-range band filters _____

Speaker baffles, directional or flat. (State if speakers are exponential horns.) _____

How are fields supplied? _____

Voice-coil impedances:
Speaker 1 _____
Speaker 2 _____
Speaker 3 _____
Wide-range unit _____
How are speakers flown for stage presentations? _____

Monitors:
Number of monitors _____
Where located _____

Type:
Monitor 1 _____
Monitor 2 _____

Make & model:
Monitor 1 _____
Monitor 2 _____
How are fields supplied? (If PM, so state.) _____

Voice-coil impedances:
Monitor 1 _____
Monitor 2 _____

Transmission line:
Length of line from booth to stage _____
Type cable _____
Switches or speaker plug-boxes backstage _____

Remarks _____

6. CONTROLS & METERS

Switches:
If more than one unit of sound system is controlled by one main on-off switch:
Type of switch _____
What it controls _____
Location _____
Fuses: Type _____
Rating _____
Location _____
If rectifier circuit is controlled separately:
Type of switch _____
Location _____
Fuses: Type _____
Rating _____
Location _____
If amplifier is controlled separately from rectifier:
Are there separate switches for filaments and plates? _____
Types of switches _____
Location _____
Fuses: Type _____
Rating _____
Location _____
If exciters are turned on by separate switches:
Types of switches _____
Location _____
Fuses: Type _____
Rating _____
Location _____
Speaker field switches and fuses:
Types of switches _____
Location _____
Fuses: Type _____
Rating _____
Location _____
Safety door switches:
Location _____
Type _____
Control what _____
Miscellaneous switches and fuses: _____
Remarks _____

Fader Switches, Volume & Tone Controls:
Faders:
Make & type _____
Serial Nos. _____
Are faders in amplifier cabinets? _____
How operated (Give specifications of relays or potentiometer faders.) _____
Are faders synchronized with change-overs? _____
Specifications of automatic change-over-faders _____

Volume (gain) Controls:
Make & type (If potentiometer fader, so state.) _____
Is volume control in amplifier cabinet? _____
Remotely controlled volume controls:
Type and location _____
How is volume control connected in system? _____

Tone Controls:
Make & type _____
Is tone control in amplifier cabinet? _____

Speaker Switches:
Stage Speaker Switches:
Type and specifications _____
Where located _____

Monitor Switches:
Type and specifications _____

Monitor Volume Control
Where located _____

Remarks _____

Meters:
Line (power input) Voltmeters:
Make & model _____
Number of voltmeters _____
Normal reading (A.C. or D.C.) _____
Where located _____

Rectifier Output Meters.

Voltmeters:
Make & model _____
Number per rectifier _____
Normal reading _____
Where located _____

Ammeters:
Make & model _____
Number per rectifier _____
Normal reading _____
Where located _____

Amplifier Meters.

Filament voltmeters:
Make & model _____
Number per channel _____
Normal reading _____
Where located _____

Filament ammeters:
Make & model _____
Number per channel _____
Normal reading _____
Where located _____

Amplifier Plate Current Milliammeters:

First stage:
Make & model _____
Normal reading
Location _____

Second stage:
Make & model _____
Normal reading _____
Location _____

Third stage:
Make & model _____
Normal reading _____
Location _____

Fourth stage:
Make & model _____
Normal reading _____
Location _____
Subsequent stages. (see remarks at end.)

Photocell Polarizing Current voltmeter:
Make and model _____
Number of voltmeters _____
Optimum reading _____
Where located _____

Exciter Current Meters.

Voltmeters:
Make & model _____
Number of voltmeters _____
Normal reading (A.C. or D.C.) _____
Where located _____

Ammeters:
Make & model _____
Number of ammeters _____
Normal reading (A.C. or D.C.) _____
Where located _____

System output volume - indicator meter:
Make & model _____
Specifications _____

Remarks _____

Panel and Pilot Lights:
Type _____
Number _____
Location _____
Type _____
Number _____
Location _____
Type _____
Number _____
Location _____
Remarks _____

7. MISCELLANEOUS APPARATUS

INTERNATIONAL PROJECTIONIST • August 1947

Westrex Service Plan Designed to Retain U. S. Lead in World Equipment Market



WESTREX POSTWAR THEATRE SOUND TESTING EQUIPMENT

O C. Johnson, assistant chief engineer, and U. D. Ross, Latin-American manager, inspecting the Westrex field oscillator-gain set. Other units of equipment are, top row: Brown Engineering model 200A impedance bridge; Hewlett-Packard model 200B audio oscillator; Westrex M2 multi-purpose test meter, and DuMont type 208 oscilloscope. Bottom row: Waterman "Pocket-scope"; Hewlett-Packard model 330B distortion analyzer, and Daven model 6C gain set.

PERUSAL of the monthly reports issued by the U. S. Department of Commerce relating to the export of American motion picture equipment is convincing evidence of the superiority of and preference for such equipment in the world market. At the same time, one is often led to wonder just what effort is expended by American manufacturers to keep their goods sold in terms of adequate on-the-spot service.

Evidence of growing determination on the part of U. S. suppliers to retain their dominant hold in world film markets is at hand in the comprehensive program designed to provide the highest quality service to foreign exhibitors which has been initiated by Westrex Corp., foreign motion picture equipment and service subsidiary of the Western Electric Co. O. C. Johnson, assistant chief engineer of Westrex, has embarked on a three-month tour of Latin America which will take him, in succession, to Mexico, Panama, Colombia, Peru, Chile, Argentina, Brazil, Trinidad, Venezuela, Puerto Rico, and Cuba.

Coincident with his arrival at the foreign locations, newly-developed testing equipment will be supplied to the local offices. Johnson will not only instruct Western Electric engineers in the Latin-American territories in the proper use of the test sets, but will also explain recent technical developments.

Intensive Service Course Given

Johnson will stay ten days in each of the territories, devoting the first three days to an intensive course of instruction, and spending the remaining week on field work with the local engineering staff. He will visit several theatres to investigate sound and projection quality and recommend treatment in especially troublesome situations.

Local exhibitors will be urged to take advantage of Johnson's visit by submitting their theatre problems to him for his recommendations. The service is to be furnished without charge, with Johnson giving personal attention to each query.

The bulk of the test equipment being supplied in connection with the program is intended for laboratory work in the main foreign offices, but individual engineers will be furnished several items of equipment for routine service work.

Of particular interest is a new multi-purpose meter which represents a notable advance in instruments of its type. Compact and easily carried, the meter was developed by Westrex for making the many measuresments of current, voltage, resistance, and decibels necessary in the involved problem of checking theatre sound reproducing systems. Since portable meters have in the past been susceptible to a factor of error induced by the instability of the copper-oxide rectifier, the new meter is equipped with a germanium rectifier which is more stable and will withstand without damage heavier overloads and higher temperature than was formerly possible. Adding to its remarkable accuracy is the fact that it is temperature-neutralized.

Also to be supplied for routine work will be all of the new standard types of test films and a lens adjusting tool which will expedite the focusing and orienting of phototube lens assemblies of film pick-up systems.

Precise Testing Units Used

To aid in tune-up and technical inspection, a new oscillator-gain set has been developed by Westrex. Weighing only 6½ pounds and contained in an exceptionally small case, this complete gain set has a self-contained R-C audio oscillator and db meter for transmission tests. It provides an audio signal constantly variable from about 3½ octaves below middle C to 6 octaves above middle C.

Its measured output can be read as low as one ten-millionth of a watt for calibrating and checking theatre systems at the extremely low level output of the photocell.

For the major offices having shops that do extensive repair work, Westrex is providing a precision audio oscillator, a noise and distortion meter with self-contained vacuum tube voltmeter, a 40 db voltmeter amplifier, and a band-pass filter continuously variable from 20 to 20,000 cycles. An important item in the current program will be an impedance bridge for making measurements of d.c. resistance, capacity, inductance, "Q", *etc.*, the bridge having a self-contained 1000-cycle tone source.

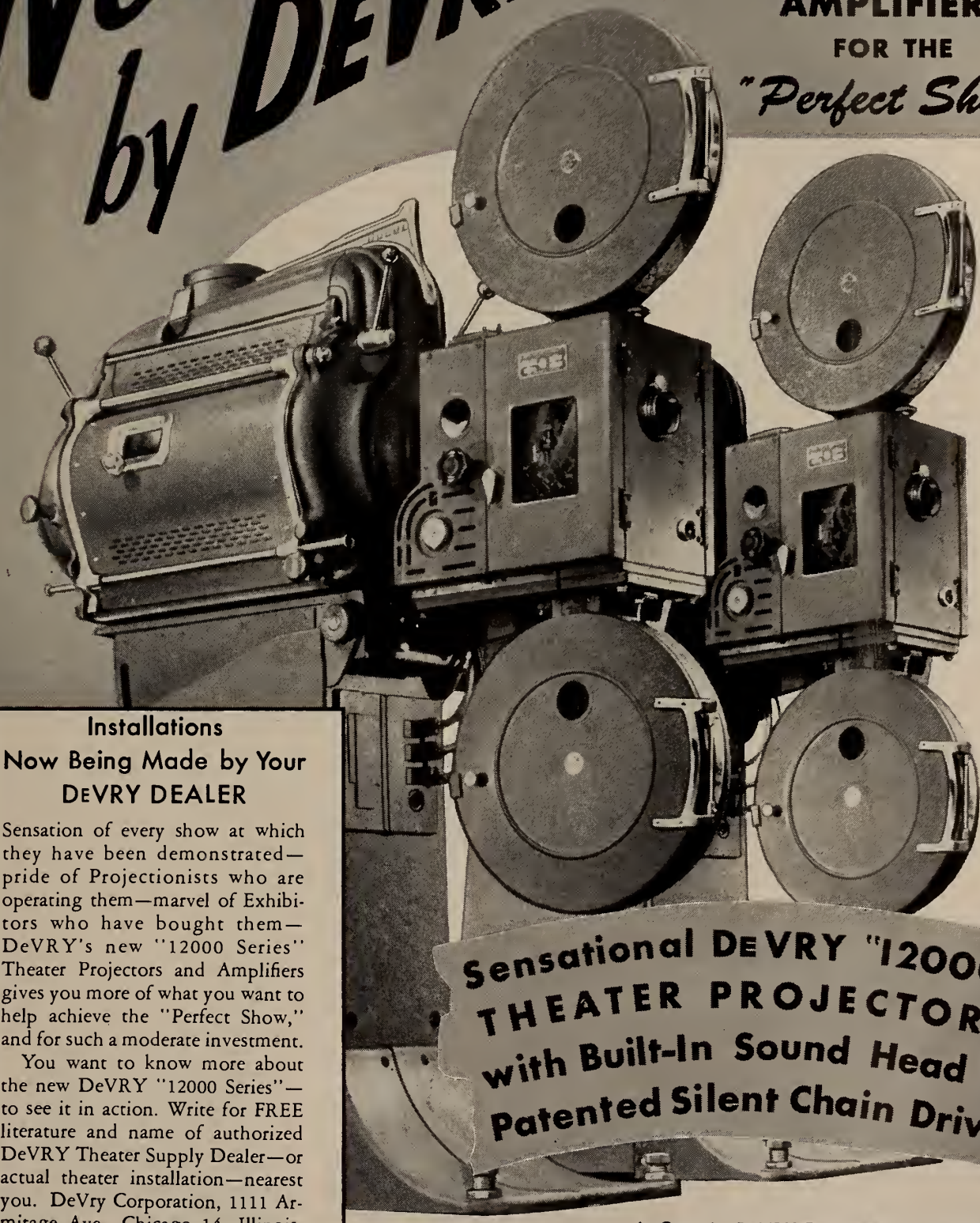
This program of instruction and supply of test equipment, being launched in Latin America, will shortly be expanded to cover Europe, the Far East and Westrex offices throughout the world. An initial outlay of $75,000 has already been made to cover costs, with later expenses expected to run the total far higher.

It is anticipated that more than a year will be required to complete the world-wide program which should bring about the highest standards yet attained in foreign servicing of motion picture houses.

PROJECTIONISTS' SERVICE MANUAL $3.00

New by DeVRY

Improved
PROJECTORS
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AMPLIFIERS
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Sensation of every show at which they have been demonstrated—pride of Projectionists who are operating them—marvel of Exhibitors who have bought them—DeVRY's new "12000 Series" Theater Projectors and Amplifiers gives you more of what you want to help achieve the "Perfect Show," and for such a moderate investment.

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AT YOUR SERVICE

This department is devoted to the man behind the man behind the gun—the serviceman. Its prime purpose is to promote a closer relationship between projectionist and serviceman based on a better understanding of their mutual problems through an exchange of news and views, kinks and kicks. Contributions from both groups are invited.

Contact Noise Reduction

In the never-ending search for a salve to eliminate noise in sound systems, I finally found a lubricant called LUBE-REX, manufactured by General Cement Co. and available in nearly all radio stores at 15c for a small bottle.

One bottle has been used in the past three months on faders, rheostats, gain controls and switches, with a considerable reduction in contact noise. In no case to date has a second application been necessary.—H. J. Nelson, *ALTEC.*

Emergency Operation of Stripped Gears

Here is an interesting recent experience, when I found an E-7 stuck and a stripped SH-2060 drive gear. Located and repaired stuck shaft and bearing in projector. Took the SH-2060 gear to machine shop and had the gear sawed in half vertically. I rotated the two halves until the stripped teeth were matched up with good teeth, then bolted the two fibre halves back to the steel pinion in that position.

This repaired gear ran for three days before a replacement was received. This same emegency repair can be made on a number of fibre gears in projectors as well as on drive gears.—D. M. Davis, *ALTEC.*

Fader Exciting Lamp—Universal Base

Occasionally I find in P-464367 exciter lamp assembly on Type 1 soundheads that the screw holding the soldered lug of the pigtail to the bottom contact of the lamp is slightly loose. This causes overheating of the bottom connection strip, which in turn causes the solder to run and results in inefficient exciter light, *etc.* Have been able to balance sound between machines by tightening these screws.—W. K. Bach, *ALTEC.*

Brenkert Enarc Lamp Reflectors

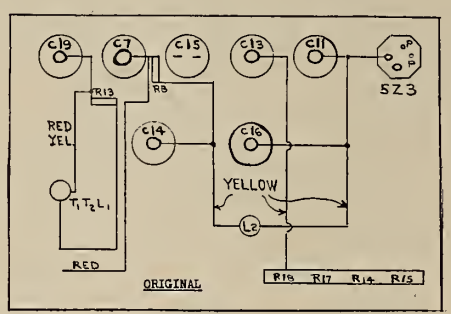
Enarc lamps were originally supplied with reflectors the working distance of which (back of reflector to film plane) was 31½ inches, plus or minus ½ inch. These lamps used a single stop screw as a carbon guide, No. N-435, which was mounted in the N-791 burner base shaft, shown in diagram 6, "Lamphouse Unit" of the Brenkert Enarc operating manual.

Subsequently reflectors were used with a working distance of 33½ inches, plus or minus ½ inch. All these lamps have a small quadrant under the head of the stop screw.

It is thus apparent that by checking which type of stop is used on the left-hand burner base shaft, it can be immediately determined which of the two working distances is correct for any particular Enarc lamp.—C. W. Williams, *ALTEC.*

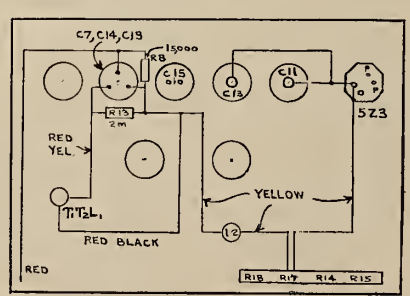
MI-1224 Condenser Substitution

If any of the boys have RCA MI-1224 amplifiers with the standard 8-mfd., 450-volt electrolytic filter condensers in-



MODIFICATION PARTS LIST

The following dry electrolytic FP type capacitors are required: two 15-mfd., 450-volt RCA Part No. 28,119 for C11 and C13; one 10-10-10 mfd. 450-volt RCA Part No. 28,113 for C7, C14, and C19.



stalled, I would strongly recommend that they be replaced. I have used the I 58-type with very good success; but RCA has a modification which they use now which some projectionists may prefer. I have no theatres where the RCA modification has been made, but I have had trouble with all of the 8-mfd., 450-volt condensers. Accompanying this are rough sketches of the RCA modification, including the parts list.—E. C. Lyman, *ALTEC.*

Checking Projector Motor Speed

I find that running the 300-cycle loops in both projectors and switching from one to the other will give a reasonably accurate quick check on the motor speed. If one motor is running too slow, it will be revealed quickly in the 300-cycle note, and then a more definite check can be made on the motor in question.

At the same time the aforementioned check is made, if the motor is started with the exciter lamp on and the volume control well advanced, a good check is also given on stabilizer accelleration.—C. R. Shepard, *RCA.*

Test Leads Aid

Plastic spirals sold under such trade names as "Kant Kink" can be used effectively with test cords and may save a few minutes of fumbling in avoiding untangling test leads.—E. T. Brown, *RCA.*

Twisting Wires for Conduit

Where it is necessary to twist a pair of wires, it has been found that by cutting the proper lengths and using the hand rewind to twist them, a very uniform twist may be had. It may be done quickly, and several pairs uniformly twisted will pull much easier through conduit.—B. B. Savage, *RCA.*

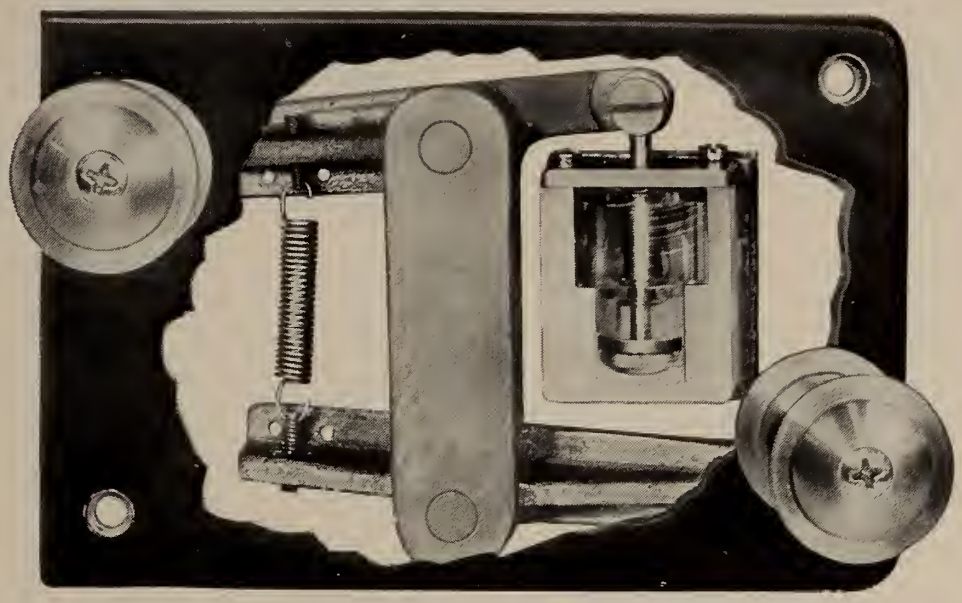
Locating, Repairing Changeover Switch

A 3-inch jumper wire, with two alligator clips, is very useful in quickly locating and repairing a defective changeover switch in the AM-101 Simplex amplifier. If the sound is dead, clip the jumper across Terminal Nos. 5 and 7. If this does not restore sound, clip the jumper across Nos. 6 and 8. Operate changeover from the other projector. Replace switch when convenient. If exciter lamp is out, clip across a.c. and No. 3, or across d.c. and No. 4—G. E. Williams, *RCA.*

Oscillation in Simplex 'A' Systems

When oscillation is encountered in the Simplex "A" system because of the substitution of 6L6-G tubes for the 6L6 metal tube, the trouble may be eliminated by making some metal shields for the tube top of the 6J7 tubes.—A. L. Friel, *RCA.*

For the *best* in motion picture sound...



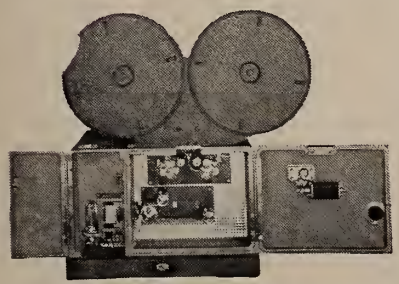
The *Western Electric* Mechanical Filter

cuts flutter to less than half the accepted standard

YOU can forget flutter when you use a Western Electric recording system with its new mechanical filter. The Academy of Motion Picture Arts and Sciences limits uneven film motion (flutter) to 0.15%... but the Western Electric filter holds it down to no more than *0.05%* in any particular frequency band, and total flutter down to no more than *0.07%*.

You can forget the filter, too—for it's a simple trouble-free mechanism that requires no adjustment. A precision fitted piston operates in a leakproof cylinder containing a damping fluid which was especially selected for its constant viscosity.

This mechanical filter is but one of many reasons why the new line of Western Electric recording equipment gives the best in motion picture sound. The line is made up of *all new* units—mixers, limiting amplifiers, noise reduction units, regulated power supplies and fully automatic recorder controls.



The Western Electric 300 Series, "Junior" member of the new line, for main channel, standby or portable service, records on either 35 mm or 16 mm film. The change-over is quickly made with simple tools.

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IN THE SPOTLIGHT



By *HARRY SHERMAN*

CONTRIBUTING to his standing as one of the keenest-minded labor leaders in America, and engendering a new line of thought relative to Labor's approach to the Taft-Hartley bill, is the memorandum sent recently to 450 local unions by Dave Dubinsky, president of the International Ladies Garment Workers Union and vice president of the A. F. of L.

Ever a staunch advocate of conciliation in labor disputes, Dubinsky, while making it clear that he regards the T-H law as "vicious and inequitable," said that his union would not use it as an "excuse for shirking its responsibility to maintain stability in shops that had contracts with the ILGWU." He advised local union officials to continue signing "no-strike" agreements where employers agreed to maintain the union shop and to resolve all difficulties by arbitration (*see "Monthly Chat," p. 3, I.P. for July, 1947*).

The union intends to protect itself against damage suits by specifying in all agreements that arbitration would be used to adjust all charges of violation of the agreement, instead of recourse to the courts. The union will undertake to get its members back on the job within 24 hours if an illegal strike occurs. Where the members are defiant, the arbitrator will have the right to declare their jobs vacant. If he decides that the union is at fault or has been derelict in getting the workers to return, he may declare the contract terminated.

To make this plan practicable and as a further measure of protection against charges of contract violation, Dubinsky will invest local officials with responsibility to act for their locals. He stated flatly that the T-H law rendered inadvisable the continuance of remote, tenuous and overly tight control of a local's procedure by the International office. Of course, added Dubinsky, if the ILGWU's right to a union shop be denied, his union will then disclaim any responsibility for continuance of production in that particular shop.

Dubinsky also recommended that locals leave some latitude for bargaining in their original presentation of demands to employers, lest they be accused later of failure to bargain in good faith.

• Ever a controversial topic, particularly when labor contracts are being negotiated, the steadily increasing cost of living over the past 15 years and its relation to wages, expressed in both percentages and dollars, is graphically set forth in three charts recently compiled from official Government data by Los Angeles Projectionists' Local 150.

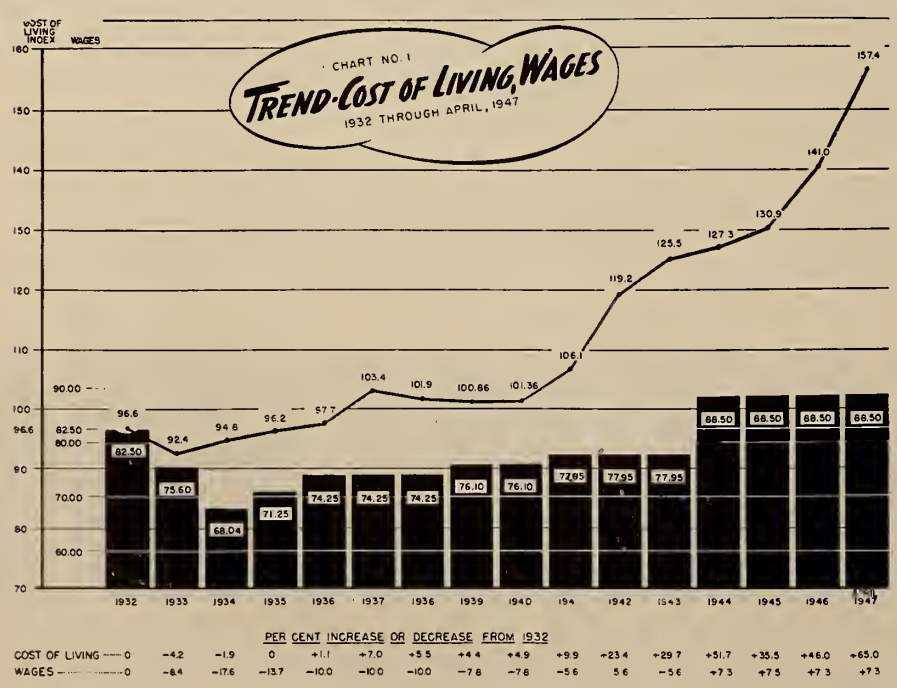
These charts, reproduced here, are of paramount importance to the projectionist craft in that the figures therein relate specifically to the craft rather than to any general labor level or any particular area. Wage figures cited in the charts reflect the exact salaries received by Local 150 members during the period covered—from 1932 to April of this year.

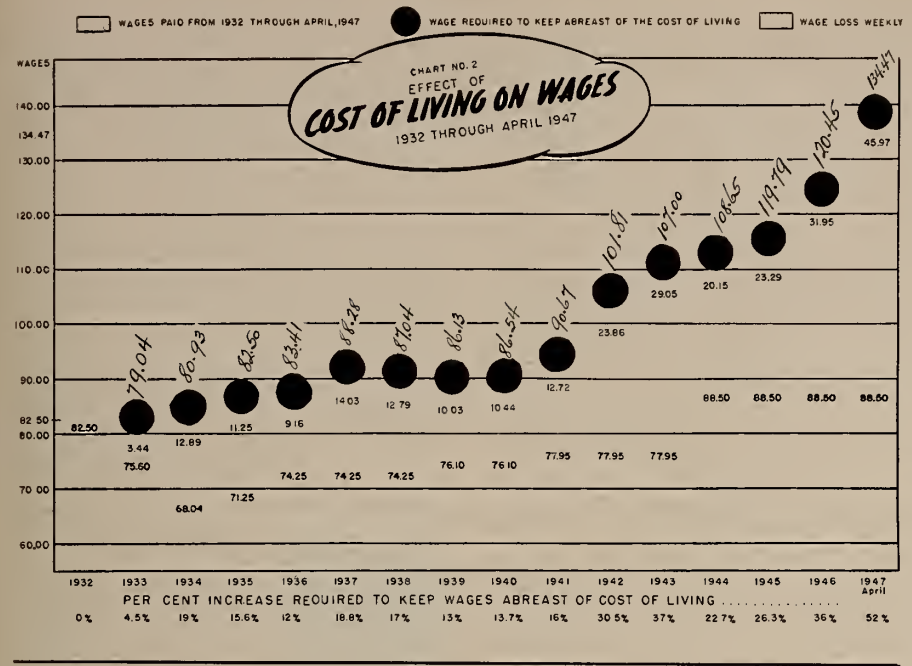
Chart No. 1, for example, discloses in terms of actual dollars and cents the trend of the relationship between cost of living and wages received. The cost of living curve shows a small but steady upturn from 1932 to the beginning of 1941, from which date on up to 1947 the curve veers sharply and constantly upward. The real story is told by the percentage figures at the foot of the chart, which show that while living costs had risen 63% over the 1932 base figure, the wage increase received by Local 150 members averaged only 7.3%.

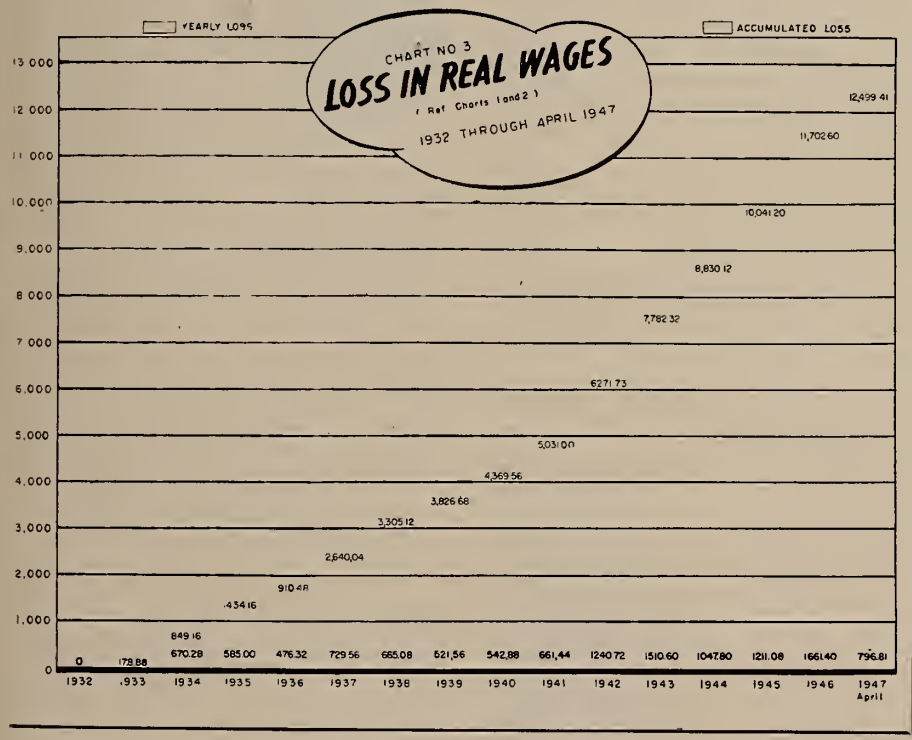
This represents a clear deficiency of 55.7% sustained by Local 150 members.

Chart No. 2 is even more revealing in terms of dollar loss to Local 150 men. Graphically portrayed is the actual wage paid and also the wage that should have been earned to enable the workers to merely keep abreast of skyrocketing living costs. The last column on this chart tells the story of the highly unfavorable position of Local 150 members today. So plain are the facts that even he who reads as he runs cannot fail to grasp their significance: *every week worked now* sees the Local 150 member fall short by $45.97 of earning enough to sustain his 1932 living standard.

Chart No. 3 shows by what margin of







dollars the worker has fallen behind the cost of living during each year since 1932, and the accumulated loss during any series of years during the past 15, together with the total acccumulated loss for the entire span. Consistently losing ground, as is clearly shown, the Local 150 man has now sustained an accumulated 15-year loss of $12,499.41.

Spread over a 15-year period this accumulated loss may not seem to be too imposing a figure; but its real significance is apparent by referring to the loss of various single years—that annual deficiency of five- or six- or seven hundred dollars which compels a drastic lowering of a man's living standard.

In sharp contrast to the story told by these charts are the figures of film company earnings published in I. P. for November, 1946 (p. 19) and for June, 1947, p. 19. A return in net worth of 35% *within only two years* is only one revelatory aspect of these earnings figures.

Local 150 is deserving of the highest praise and heartfelt thanks of the craft for the initiative and common sense it displayed in thus rendering crystal-clear the true story of the relationship of cost of living to wages received.

• Another development in the T-H law clambake was the announcement by the U. S. Department of Labor that, in view of the legislative history of the bill, it would "probably keep secret" the financial data required to be filed by unions appealing to the NLRB. The department cited an unsuccessful attempt to write into the act a provision for making public the data filed with the department.

• Larry Katz, I. A. representative, did a nice job in settling the wage disputes in Harrisburgh, Penna., between the exhibitors and the two I. A. local unions—Projectionists Local 488 and Stagehands Local 98. Three-year contracts were agreed upon, calling for salary increases retroactive to January 1947.

• It is hard to believe that Jimmy Murtagh, former treasurer of Detroit Local 199, has passed on. Jimmy, whose inexhaustible fund of good humor and ready wit made him a popular figure at all gatherings, died the early part of this month. We remember the hilarious session in his hotel room at the 1946 Chicago Convention when one of the men hid his false teeth, and the frantic search for them. His good sportsmanship and ability to take a joke as well as give it was one of his outstanding characteristics. To his survivors go our condolences.

• Tom O'Brien, general secretary of NATKE and Labor member of the British Parliament, attacked the new 75% tax on the earnings of American films shown in England. He hit the new tax as displaying a "callous disregard" for the British film industry. O'Brien speaks for over 60,000 theatrical workers in his country and is very much concerned about the effect of this drastic action on the future welfare of his men.

• The first and only gold honorary membership card ever issued by St. Louis Local 143 has been awarded to Lou Walters, Southwestern sales representative for Ampro Corp. Lou formerly headed National Theatre Supply's Cleveland and RCA's St. Louis offices, and won the respect and friendship of all Local Unions he dealt with by his keen sense of fair play and his willingness at all times to cooperate with our boys. His new headquarters are now located in Dallas, from which point he will make frequent trips throughout the Southwest territory.

• When an exhibitor who makes no secret of his dislike for labor unions publicly blames the high cost of motion picture production on the tremendous salaries paid movie stars and not on "labor costs," then it is time for all concerned to sit up and take notice. Harry Brandt, president of New York's Independent Theatre Owners Association, re-

cently accused producers of giving fabulous contracts to many overrated stars at "inflationary" salaries, in addition to many concessions such as percentages of the box-office take and authorization to select their own stories and directors. He stated that in many cases the drawing power at the box office of many of these overpaid stars did not justify their tremendous salaries.

For once we are in complete agreement with Mr. Brandt, but we don't think he went far enough. These very same producers who squander hundreds of thousands of dollars on high-priced stars, costly sets, *etc.*, very often raise the roof when it comes to paying a skilled mechanic a few extra dollars. We have in mind a particular producer and his general manager, who, while looking at one of their features in a preview room, told the projectionists on duty to stop the picture in the middle of reel two and continue with the showing the next morning. This was done so as to avoid paying the projectionists one hour overtime. Yet this very producer spares no expense in lining up high-priced stars for his studios.

25 Years Ago—August 1922

A quarter of a century ago Charlie Shay, then I. A. president, appointed yours truly an International representative, or organizer, as it was then called. Later, when William F. Canavan became the new I. A. president, we were appointed to the office of assistant president, a post we held for several years. During our affiliation with the General Office we spent most of our time traveling about the country serving the various I. A. Local Unions in one capacity or another and we made many friendships that have endured to the present day. We hope to continue to be of service to our hundreds of friends in the Alliance and we are happy in the knowledge that our efforts are appreciated . . . Dick Green, second vice president, ill in his Chicago home, was visited by I. A. president Shay . . . British theatrical unions rumored to be planning to amalgamate . . . Wayne B. Wheeler, counsel for the Anti-Saloon League took a crack at theatres with the statement that "theatre and moving picture houses are being used as liquor propagandists" . . . Will Hays returned from a visit to the Hollywood studios much impressed with the magnitude of the industry . . . Vice president Bill Canavan was assigned to investigate troublesome situations in Minneapolis, St. Paul, and St. Louis . . . J. C. Walton, member of Oklahoma City Local 112, received the Democratic nomination for governor of Oklahoma . . . San Bernardino, Calif. application for I. A. charter turned down . . . The "Labor Review" charged that U. S. Commissioner C. J. Skinner, of Augusta, Ga., rendered a guilty decision in the case of striking railway shopmen BEFORE he heard the testimony. He was accused of having prepared a typewritten statement in which he declared that the "facts" of the case warranted his decision before the evidence was even presented.

• The I. A. General Executive Board met in Boston August 18, immediately following the 3rd District assembly on Sunday, the 17th. Boston Locals 11 and 182 were hosts at a series of entertainments for the visiting officials. Eddie Miller, I. A. representative and business agent of Houston Local 279, and Gene Atkinson, business agent of Chicago Local 110 and I. A. delegate to the American Federation of Labor, stopped off in New York for a short visit prior to attending the board meeting.

• We congratulate Nat Doragoff, recording secretary for the past several years for New York Local 306, on his recent appointment as referee to the Workmen's Compensation Board, replacing Alexander J. Gompers, son of the late president of the A. F. of L. Although Mary Donlan, chairman of the board officially appointed him, Doragoff announced that it was due in great measure to the efforts of Tom Murtha, business agent of Brooklyn Local 4 and chairman of the 10th District, and H. Paul Shay, the 10th District secretary. We shall look forward to seeing Doragoff, who is a lawyer by profession, cover himself with honors in his new post. To this end he has the best wishes of his many friends in and out of Local 306.



Nat Doragoff

• We were saddened to learn of the death of Oscar Moody, business agent for many years for Local 433, Rock Island, Ill. Oscar was another of the "regulars" attending I. A. Conventions, having missed but two since 1920. We extend our sympathy to his survivors.

• Ward LaBarr, former president of Local 521, Long Beach, Calif., has some excellent ideas on projection room planning which he explained to us during his recent visit to New York. We shall present these ideas to our readers in the near future.

• The Taft-Hartley law was the chief topic of discussion at the 10th District (N. Y. State) meeting which was held in Utica, N. Y., July 26. Representatives from 54 Local Unions attended the conference which was in continuous session from 10 a.m. to 2.30 p.m Jimmy Brennan, I. A. vice president, presided, and Tom Shea, assistant I. A. president, was the guest speaker. Shea advised the Local Unions to go along as usual in the negotiations for new contracts, and suggested that they contact the General Office when stymied or in need of assistance. Charlie Sinnigan, of the Union

(*Continued on page* 38)

THE PROJECTIONIST'S STATUS UNDER THE T-H BILL

U. S. DEPARTMENT OF LABOR
WAGE AND HOUR AND PUBLIC CONTRACTS DIVISIONS
785 Market Street
San Francisco 3, California

ADDRESS ALL COMMUNICATIONS TO:

February 11, 1947

IN REPLY REFER TO:
FILE NO. JRD:LH

Mr. Milton A. Taylor
Industrial & Labor Relations Counselors Inc.
205 South Beverly Drive
Beverly Hills, California

Dear Mr. Taylor:

This is in response to your letter of February 7th asking for an opinion on whether the Fair Labor Standards Act applies to moving picture projectionists.

The projectionist employed in what we commonly call the movie theater is exempt from the minimum wage and overtime provisions of the Act under section 13(a)(2). This section provides the exemption for "any employee engaged in any retail or service establishment the greater part of whose selling or servicing is in intrastate commerce". However, projectionists may be engaged in other types of employment which would make the above exemption inapplicable. For example, projectionists showing safety films, production method films, and other types of industrial educational pictures related to the production of goods for commerce for employee educational purposes, would be covered by the Act and nonexempt by reason of being engaged in an occupation necessary to the production of goods for commerce.

In case the foregoing fails to adequately answer the question you have in mind, please write me again giving me more details concerning the employment of the type of projectionists in question.

Very truly yours,

John R. Dille
Regional Director

Bearing on the highly controversial issue as to whether projectionists are subject to the provisions of the Taft-Hartley bill is the accompanying reproduction of an official letter from the San Francisco office of the U. S. Dept. of Labor. By and large, it would appear that projectionists are exempt from the Law; although the letter emphasizes that the type of picture shown may determine the worker's status. With neither Labor nor employers in the film field anxious to press for final determination of this question, the issue may be left in doubt for a considerable period of time.

RCA's New Dual Track, Multi-Frequency 35-mm Transmission Test Film

By EDWARD STANKO

Manager, Technical Section, RCA Theatre Service Division

A new dual-track test film, designed to help make frequency response, overload, and system gain measurements on all types of 35-mm sound reproducing systems with maximum accuracy and speed, is now being used by all RCA theatre service inspectors. The film, labeled as the RCA 45445-3, was developed by the RCA Service Co., Inc., in collaboration with the RCA recording studios at Hollywood.

The service inspector uses one of the films' two tracks for making comprehensive frequency response tests. The other he uses principally for checking the sound system's gain and power output performance, and for making ordinary frequency response checks during routine inspections.

The track for frequency response tests has 32 selected frequencies ranging from 30 to 10,000 cycles, together with a 1000-cycle reference section at each end. This track has approximately three times as many frequencies as are provided by other frequency test films. The band of frequencies in between any two of the film test frequencies, therefore, is correspondingly narrower.

Close Check on 30 to 10,000 Cycles

These narrower intervals makes it possible to detect any serious response irregularity, even sharply peaked ones, between 30 and 10.000 cycles. This track is used when making final tests of each new installation to make absolutely certain that the equipment has been properly compensated to conform with approved standards. It is also used whenever any adjustments which affect the system's frequency response are made.

The other track, designated as the "Overload Test Section," is made up of three sections and the following tests: spot check of frequency response, power output of system amplifier at 50, 1000 and 5000 cycles, and system gain. The first part of this other track is a short frequency film with 1000, 50, 125, 300, 3000, 5000, 7000 and 8000 cycles per second. This section is used to make a quick frequency run on any type of 35-mm sound equipment to determine whether any change has occurred since the last tests or to quickly check any change in compensation. The volume level of this part is the same as that for the 32-frequency track.

The second part, which is for overload tests, starts out with six sections of 50-cycle recording. Each section of this track is recorded 2 db higher in level than the section preceding it. When the first section starts through the system, the service inspector adjusts the system gain control and fader so that the output meter reads approximately 6 db below the normal rated power output of the amplifier under test.

As each succeeding section comes up, the signal to the amplifier will increase by 2 db and its output, therefore, will increase in a like amount until the overload point is reached. When the output meter fails to show a corresponding increase in output for such a 2 db increase of input, the inspector knows that the amplifier has reached its overload point.

Minute Distortion Discernible

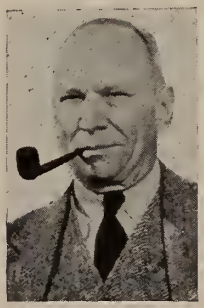
The six sections of 50-cycle recording are followed by six sections of 1000-cycle and six sections of 5000-cycle track which have been recorded in the same manner. By means of this simple method of measuring the system overload point, one can quickly measure the undistorted output at 50, 1000 and 5000 cycles. If the system overloads before it reaches its normal power output at any of these frequencies, the inspector knows that the system either requires adjustment or that some component has become defective.

Immediately following the overload test part, there is a 30-foot section of low level 1000-cycle recording. The level of this section is minus 78 db. The recorded level for this section was deliberately made so low that when it is run in any theatre sound system the gain or volume control and the fader can be turned to full "On" position without danger of overloading the amplifier. Under these conditions, the system operates at maximum gain, and the output, as measured with an output meter, will give a direct indication of this gain.

Once the inspector has determined the normal gain for a particular system, this simple check will quickly indicate any departure from normal. In addition, this simple and straightforward method of determining gain makes unnecessary the somewhat complicated computations involved in other methods, thus eliminating several sources of possible error.

E. G. Hines Now GPE Chairman; is Succeeded by H. G. Place

Earle G. Hines, president of General Precision Equipment Corp. since 1936, on August 1 became chairman of the board of directors. He will be succeeded as president by Herman G. Place, banker and industrialist, who was active in the reorganization of G.P.E. in 1936 and has since been a director of the corporation. Place, a graduate of Cornell University, has served as an officer in banks, including the Seaboard National, Equitable Trust, and Chase National, but most of his activities with these institutions were concerned with film industry problems, including the reorganization of Fox Film Corp. and Fox West Coast Theatres.



Earle G. Hines

Hines, who as board chairman will continue to take an active part in the affairs of G.P.E., pointed out that the corporation was a holding company, the affairs of which are largely concerned with finance, business and legal advice, and other assistance to the management of its 13 subsidiaries. For this reason, said Hines, the appointment of Place was particularly fortuitous, in view of his extensive banking and corporate experience.

G.P.E. subsidiary corporations are: International Projector, National-Simplex-Bludworth, Strong Electric, J. E. McAuley, Hertner Electric, Ampro, Cine-Simplex, Theatre Equipment Contracts, Motion Picture Engineering, Bizzelle Cinema Supply, Askania Regulator, Librascope, and G.P.E. Laboratories.

Push-Button Panel Mixes 1000-Gal. Batch of Photo Solution

A push-button control system for mixing photographic solutions in 1,000-gallon batches is disclosed by Eastman Kodak Co. Previously, photographic solutions were mixed in much smaller quantities—about 200 gallons—and several separate operations were necessary at various locations.

By operating various valves and levers at the control board, a technician is able to stir the solution, control the amounts of liquid pumped into the mixing tank, and drain the final solution into storage tanks. Dials and gauges on the panel tell the operator at a glance the status of his "photographic recipe."

This is how a photographic solution is put together under control-panel guidance:

1. Powdered chemicals, accurately weighed, are dumped through stainless steel hoppers into the 1,000-gallon mixing tank, which is on the floor below the control board.

2. Liquid ingredients for the formula are pumped into the tank by means of panel control valves.

3. Another lever starts a five-horsepower mixer whirling in the tank.

4. After the "egg-beater" step has been completed, the solution is filtered, then pumped into storage tanks. When laboratory tests have been finished and the solution pronounced satisfactory, the liquid is bottled.

WHAT MAKES GOOD SPEAKERS?

(*Continued from page 6*)

horns for both low- and high-frequency projection, together with driving units of special high-efficiency design, provide the increased efficiency which is economical in reproducing systems operating at high power levels. The low-frequency drivers, the 12-inch 754A and 754B, have voice coils of edge-wound copper tape and special magnet materials to furnish increased efficiency. The 754B has a phenolic diaphragm adapted to use in outdoor installations.

Two exponential low-frequency horns have been designed for these systems, one to accommodate a single 12-inch driver, and one for two 12-inch drivers working side by side. Response down to 40 cycles allows reproduction of the lowest frequencies required in high-quality, high-level sound systems. The mouths of the low-frequency horns are designed for proper distribution of energy of the whole range of frequencies covered.

The air chamber in back of the low-frequency drivers is completely enclosed and provides proper acoustic loading for the low-frequency response described. This closed arrangement avoids the raggedness in the low-frequency characteristic which often results from using a portion of the back radiation to reinforce the bass response.

Various Combinations Available

The complete systems are furnished in various combinations of the low-frequency horns and drivers with the KS-12024 and KS-12025 horns and 713B high-frequency receiver, to form loudspeaker systems covering every requirement for high-level, wide-range reproduction.

The mechanical characteristics of the new high-level systems have been carefully considered to reduce to a minimum the size, weight, and space requirements of each system. As a result, each one of the new models offers a saving in weight and size over speakers of comparable power capacity formerly available.

Special Speaker Needs of Theatre Sound Systems

The special needs of motion picture theatre sound systems are well understood in the industry. The primary requirements for speakers in movie theatres are:

(1) Speakers must have high power capacity with high efficiency, and provide a wide dynamic range.

(2) Distribution pattern must be controllable to match the size and shape of individual theatres.

(3) Close control of the frequency balance and other characteristics is necessary to insure the proper "presence" and to add effectiveness and drama to speech, music and every kind of sound effect.

The new W. E. high-level systems have been designed to provide all of the characteristics needed in a theatre sound system. The range of power levels up to 120 watts covers the sound level requirements of every size of theatre from the smallest up to the mammouth movie palaces seating several thousand persons.

Each speaker is supplied in a baffle which mounts, at the top, the KS-12024 or KS-12025 high-frequency horn, used singly or in combinations to give horizontal high frequency coverage from 50 to 100 degrees. The high frequency horns are driven by a new receiver, the 713B, especially designed for these high-efficiency systems.

The baffle supplied with each speaker has built into it the low-frequency horn, which is driven by one or more of the 754A units. Also included in the baffle is an air chamber of optimum proportions in back of the low-frequency speakers, which together with the horn establishes a smooth low-frequency characteristic. The necessary dividing network is built into each unit.

Thus each system is a complete, integrally designed unit, using exponential horns and special high-efficiency drivers for both low- and high-frequency ranges, fully equipped to project the highest quality of sound strictly in accordance with motion picture requirements.

The following table shows the minimum power requirements for theatre loudspeakers as recommended by the Research Council of the Academy of Motion Picture Arts and Sciences:

Power Capacity Watts	Seating Capacity
15	750
30	1400
60	2800
120	5600

The proper horizontal distribution of high frequencies will depend on a number of variables, including the acoustic treatment of the walls, ceiling, *etc.* In general, the long narrow theatres will use the KS-12024 horn for 50-degree horizontal distribution; the avearage square-shaped theatres use the KS-12025 horn for 80-degree distribution; and the theatres relatively very short from front to back, such as the typical legitimate stage theatre, use two KS-12024 horns for 100-degree distribution.

For portable sound motion picture projectors, the direct-radiator types are recommended. They are easily mounted in the standard "carrying case" enclosures which provide portability and ready setting up wherever the projector is to be used. The ten-inch 756A with 20 watts input capacity will meet the great majority of portable motion picture projector needs, giving adequate coverage of spaces seating up to several hundred people.

Grace Line Projection Setup

Pictured here is the projection setup typical of all such installations on Grace Line passenger-cargo ships leaving the port of New York. Each vessel is equipped with two Brenkert 35-mm sound projectors housed in weatherproof booths on the top deck directly aft the funnel. These booths are permanent installations and are fully equipped with film storage cabinets, splicing devices and rewinders.

The pictures are projected aft (see ports in picture) onto a portable screen 15x15 feet which is fitted between the Sampson posts alongside the swimming pool between Nos. 4 and 5 hatches and is raised about 10 feet above the deck. The speakers are fastened to the Sampson posts and directed so as to afford best reception over the width of the deck. Passengers may view the films from either the swimming pool itself, the verandah cafe, or the sundeck. A showing consists of a pre-release feature and a short.



Pictures are projected aft over swimming pool onto elevated portable screen.

All Grace Line ships out of New York utilize two members of Local 306.

Dr. A. N. Goldsmith's Tele Patents

Dr. Alfred N. Goldsmith, a frequent contributor to the editorial columns of I. P., has been granted two U. S. patents on a method for transmitting color television images. The patents, Nos. 2,423,769—770, have been assigned to RCA.

MORE 16-mm PROJECTION LIGHT

(*Continued from page 9*)

per sq mm for the 6-mm experimental carbon at 50 amps is greater than the value of 1.05 watts per sq mm reported in a previous paper as a maximum encountered in 35-mm projection. This difference is caused mainly by the greater speed of the 16-mm optical system.

The significance of the levels of radiant energy intensity listed for items (*2*) and (*3*) in Table 1 in terms of effect on 16-mm film have not been defined completely. There is some indication that the smaller frame size is better able to withstand the distortion from high-intensity radiant energy and that with certain precautions as described by Kolb, Robertson, and Talbot[5], 16-mm film can be projected without heat damage with amounts of light discussed in this paper.

It will be noted also in Table 1 that the proportion of energy in various spectral bands is about the same for both 50-amp arcs (items (*2*) and (*3*)). In addition, each of these projects has a greater proportion of the total energy in the useful visible region and so gives less heat per unit of light than the present standard "Pearlex" carbon at 30 amps (item *1*).

What Color for 16-mm?

In addition to these differences in radiant energy, the 50-amp sources give a whiter light than the color-modified "Pearlex" carbon, a color similar to that used for 35-mm film projection. Here again, the question of exactly what color quality of light will be required for 16-mm film projection remains unanswered.

As exemplified by the color-modified "Pearlex" carbon, the color of the light from the carbon arc can be modified to some extent. The indications are, however, that such modifications will result in a loss of light per unit heat and perhaps a loss in total light output, other conditions of operating being equal.

Although the specific trends and applications of 16-mm film projection for the future are not clearly evident, a demand for larger screens and for more light seems certain. This article has indicated that it is possible to extend 16-mm film projection to larger screens maintaining recommended light levels.

Although such questions as continuous burning time, color quality of light and effects of heat on film are still incompletely resolved, there is little doubt that the versatile industries in the 16-mm motion picture field can adopt carbon arc equipment to meet future requirements.

References:

[1] Lozier, W. W., and Joy, D. B.: "A Carbon Arc for the Projection of 16-Mm Film", *J. Soc. Mot. Pict. Eng.*, XXXIV, 6 (June 1940), p. 575.

[2] Kalb, W. C.: "Carbon Arc Projection of 16-Mm Film", *J. Soc. Mot. Pict. Eng.*, XLI, 1 (July 1943), p. 94.

[3] "Recommended Procedure and Equipment Specifications for Educational 16-Mm Projection", *J. Soc. Mot. Pict. Eng.*, XXXVII, 1 (July 1941), p. 1.

[4] Zavesky, R. J., Null, M. R., and Lozier, W. W.: "Study of Radiant Energy at Motion Picture Film Aperture", *J. Soc. Mot. Pict. Eng.*, 45, 2 (Aug. 1945), p. 102.

[5] Kolb, F. J., Robertson, A. C. and Talbot, R. H.: "A Method for Determining the Shape of the Image Surface in 16-Mm Projection", presented Oct. 25, 1946, at the SMPE Convention in Hollywood.

Eastman Institute Photo Center

Two years hence George Eastman House, Inc., will be in operation as a joint enterprise of the N. Y. State Board of Regents, the University of Rochester, and Eastman Kodak Co., serving as a "world historical and cultural center for the display and demonstration of the art and science of photography in all its branches." The center will be located in the late George Eastman's mansion on East Ave., Rochester, N. Y., which was bequeathed by the film pioneer to the University.

Eastman House will be not merely a museum but will provide a "dynamic demonstration of the history and continuing progress of photography in all its stages," and it will hold the historical collection assembled over a 30-year period by Eastman himself and subsequently by Eastman Kodak Co. Equipment includes some of the earliest cameras and projectors, with two of Thomas Armat's original projector models to be added. There are also several Gaumont three-color projectors dated 1912.



1 Bad sound breeds audience indignation—results in refund demands or stay-aways.



2 May even close your theatre at the peak of a smash-hit run.



3 RCA Service is your safeguard—your protection against sound breakdowns.



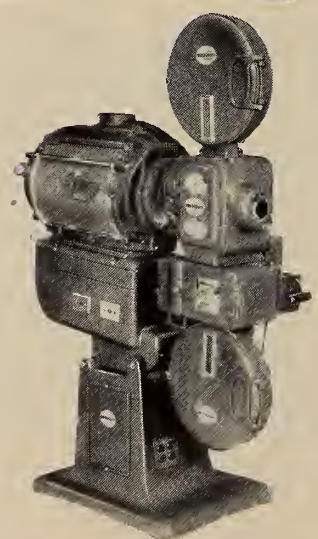
4 Keeps your box office busy catering to patrons who make your theatre their favorite.

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THE HISTORICAL DEVELOPMENT OF SOUND FILMS

(*Continued from page* 12)

were made using Case Helio lights. The forming of a company was discussed and a contract permitting de Forest to make commercial use of Aeo lights and Thalofide Cells was negotiated but not signed.

Mar. 5, 1923: De Forest notified Case he had completed eight combination pictures.

Mar. 13, 1923: De Forest exhibited his sound motion pictures to newspaper men at his New York studio. At this exhibition, the sound system included a Case helium-nitrogen-filled barium-oxide-coated recording lamp operating on direct current at low voltage and giving a moderately concentrated glow on the plate cathode. A Western Electric amplifier provided the driving power for the Helio light. The Case Thalofide Cell was used in the reproducing system.

De Forest, in his discussions with the press, referred to the Case Helio light as his "Photion". The reproduced sound showed bad mechanical motion and poor quality.

Mar. 14, 1923: Case suggested, in connection with his recording lights, the use of an oxide-coated filament as a cathode. This resulted in more light and longer life.

Mar. 17, 1923: De Forest wrote to Case saying that the latter's efforts "to improve his Photion light were well justified, so Phonofilm could be brought out soon" and that Case was entitled to broad claims on the oxide-coated filament. De Forest said he would give Case full credit for work done in perfecting his Photion tube.

Apr. 4, 1923: De Forest gave a demonstration of his sound pictures before the New York Electrical Society. In describing his recording light he stated he was using a high-frequency gas light; he gave Case credit only on the Thalofide Cell, and for valuable suggestions and improvements to "Phonofilm."

First de Forest Theatre Showing

Apr. 15, 1923: The first public exhibition of de Forest "Phonofilm" was given at the Rivoli Theater, New York.

Apr. 18, 1923: Case perfected the Thermophone for use as a microphone. This was used in making many of his early sound records.

May 7, 1923: It was found that helium purified in a calcium arc further lowered the operating voltage of Helio lights.

May 13-14, 1923: Case and Sponable visited the de Forest studio and observed weaknesses in de Forest's methods of sound recording and reproduction.

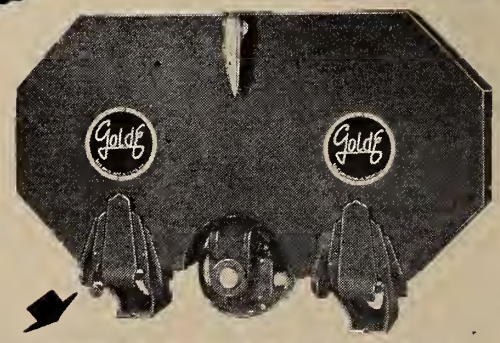
June 28, 1923: The Precision Machine Co. rebuilt the Case sound camera in an effort to reduce the amount of flutter it was causing in the recording of sound tracks.

July 3, 1923: A letter received from de Forest said that the Case Helium Photion light "had gone bad". It had been in use since May 7, 1923, and the letter raised the question as to whether it should be recoated. De Forest suggested that adding a trace of mercury would avoid certain British patents.

July 11, 1923: De Forest cited a German patent which contained an admission that it is old in the art to use a discharge containing a metallic vapor. De Forest used this patent on which to

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base his belief that any existing patent difficulty could be avoided by introducing mercury. It was possible that the coated electrode of the Aeo light producing green barium vapor in the discharge would be equivalent to introducing a metallic vapor.

Case-de Forest Join Forces

Aug. 30, 1923: The contract referred to under date of February 23, between the de Forest Phonofilm Co. and the Case Research Laboratory, was consummated. This contract granted de Forest a commercial license to use Aeo lights and Thalofide Cells in taking and reproducing sound pictures.

Aug. 31, 1923: The following quotation is taken from the Case Laboratory notes:

"A trip was made to New York for the purpose of aiding the de Forest Phonofilm Co. in setting up their *9-A* amplifier and also to test out the Case air-thermo microphone under studio conditions. A comparison of the static microphone using the old set-up previously made at the studio with the same mircophone using the *9-A* amplifier was made. These two films were also compared with a film made using the air-thermo microphone on the *9-A* amplifier system.

"At New York, it appeared that the voice reproduction on the air-thermo microphone was slightly better and clearer than the records made using the static microphone. The films, when run at this laboratory, seemed to indicate that there was little difference in these films; if anything, the static microphone was of slightly better quality.

"De Forest was shown our method of wiring up the *8-A* and *9-A* amplifiers for reproducing. This system was a great improvement over the two *7-A* boxes which he was using. This improvement was in quality rather than loudness.

"A number of experiments of the talking moving pictures were witnessed at the Phonofilm studio. These indicated that the product had been greatly improved over the old films seen on previous trips. In the case of music records, the film from this laboratory seemed to be of slightly better quality than those shown there." Both Case and Sponable were present during these conferences.

Oct. 8, 1923: De Forest informed the Case Laboratories that he now had 25 films worthy of exhibition in theaters. Did we have a supply of Aeo lights?

Intelligible Sound 'the First Time'

Nov. 14, 1923: De Forest mentioned a recording he had made of a speech by Dr. F. Crane, saying *"one can understand every word first time through."*

Dec. 7, 1923: De Forest said that the thermo-microphone supplied him by Case was "wonderful," and that the Aeo light was "working fine".

Jan. 23, 1924: For recording sound, de Forest had originally used an optical system imaging the glow discharge on a slit of the order of 3 mils wide; it now occurred to him that a narrower slit, say 1.5 mils, might be better. He recognized the problem of getting sufficient light with the narrower slit.

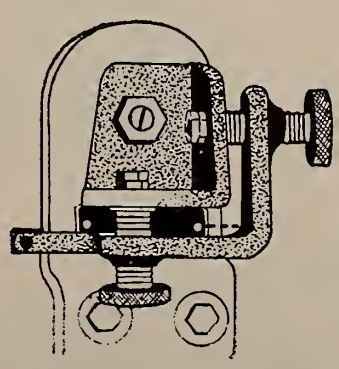
Jan. 1924: Sponable had considered the redesign problems involved in converting a Bell and Howell camera for recording sound on the same film with the picture. Bell and Howell was authorized to rebuild one of their cameras in accord with this design, which involved photographing the sound at the sprocket through a slit in contact with the film and with the Aeo light placed directly behind the slit.

Feb. 8, 1924: In the same way, a Bell and Howell standard picture printer was redesigned to provide both sound and picture printing apertures and exposure control shutters. This work was done locally.

Mechanical Slit Despaired of

Feb. 8, 1924: Case wrote: "I think it would do better to do away with the slit





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entirely in the sound reproducing chamber as a slit is liable to become dust clogged being so small, and the best method of procedure will be to construct a light with a very fine short straight filament and place a lens in front of this so as to suitably produce an image of the filament which may be brought to the size desired, say 1½ thousandth of an inch, and allow this image to pass through the sound record, spread, and then cover the Thalofide cell."

Spring, 1924: De Forest had about 20 outfits giving road-shows in theaters.

Feb. 28, 1924: A letter received from de Forest explained lack of Case publicity and stated that Phonofilm was a combined invention of de Forest and Case.

Mar. 25, 1924: The Bell and Howell camera modified for sound was received at Auburn and was tested. The motion was unsatisfactory.

May 9, 1924: Case suggested that the slit be protected by placing a glass wedge in the slit opening. Previous slits were susceptible to dirt and dust and were cleaned by opening and closing, or by an air jet.

July 9, 1924: E. B. Craft, of the Western Electric Co., advised Case and Sponable that W. E. would probably be willing to grant a license for the Laboratory to use amplifiers commercially.

July 25, 1924: De Forest began using the Case design of camera in which the sound was photographed on the film at the sprocket position. (This same method of recording still is in use in newsreel cameras today.)

Sound Newsreel in 1924

July 25, 1924: De Forest asked Case to make recordings of Coolidge and La Follette in Washington. De Forest was to supply a professional cameraman. (These pictures, photographed on August 11, were the first news sound pictures of importance ever made—Fig. 4.)

Aug. 1924: A small sound recording studio was constructed in the basement of the Case Laboratory. This consisted of a room about 10 ft. square with a 6-ft. ceiling. The walls were made of hair felt. The camera was placed outside of the studio and its lens imaged the interior through a hole in one of the studio walls.

Incandescent lighting was used to the extent of twelve 1000-watt lamps. The subject could not exist in the studio for more than a few minutes at a time without coming out for air.

[To be Continued]

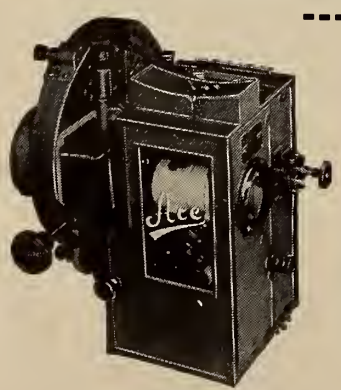
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World's Smallest Motors Shown

What is believed to be the smallest electric motor in the world—so small that two of them can be inserted in a thimble—was shown for the first time at the recent British Industries Fair. Known as "Electrotors" to distinguish them from the orthodox electric motor, these midget power units come in four sizes.

Minute Sizes and Voltages

The smallest is only 3/16 in. in diameter by 3/16 in. wide. It weighs less than 1/28 oz.—requires only 1½ volts, and has a speed of 7,000 r.p.m. Three other types are ⅞ in. diameter by 9/16 in. wide (consuming less than a flashlamp bulb), 1½ in. by ¾ in. (taking 4½ to 6 volts), and 1½ in. by 1½ in. (taking from 6 to 24 volts). They have many uses, such as for projectors, cine-cameras, movements in machines, radio control of various kinds, models, toys, automatic razors, hairclippers, stroboscopes, time fuses in projectiles, scientific instruments, and domestic labor-saving devices.

The motors employ an electro-magnetic principle hitherto unknown in electric motor design and are built on unorthodox lines. They have no commutator or soldered joints. New machines have had to be developed for the production of component parts.

ACETATE COLOR FILM STATUS

(*Continued from page* 12)

ally are the comments in the "Letters to the Editor" department on page 16 of this issue, including the views of a couple of British craftsmen. Leslie Linick, smart Local 110 fellow, appears to be well informed anent the development of the present type acetate stock, but he is slightly off the beam in stating that 1% Salol figures in the formula. Salol was and still is used by Tennessee-Eastman for certain plastic moulding compounds, but not for acetate runs.

In fact, Eastman stresses the point that the acetate film now being produced is based on an entirely new formula and differs radically from any acetate produced heretofore. The new acetate stock possesses physical characteristics similar to nitrate stock, with exhaustive tests indicating at least equal rating in terms of shrinkage, durability and all-around ability to withstand extended projection runs.

Brittleness Denied; Aperture Heat

Film manufacturers state that scattered projectionist comment relative to a tendency of the new acetate film to become brittle has no basis in fact, because neither in the new acetate formula nor in the data compiled after extensive projection tests is there any indication of the stock drying out or being more susceptible to arc light heat.

This is not to say, of course, that the new acetate film will be *less* susceptible to excessive aperture heat than is nitrate. The same precautions with respect to excessive heat now necessary with nitrate film are necessary with the new acetate stock. There has been a tendency in certain quarters to regard the slow-burning characteristic of acetate stock as eliminating the problem of excessive aperture heat. Not so, because acetate stock will buckle under excessive heat at about the same level as does nitrate film.

The splicing of acetate film is another angle which has induced extended comment by projectionists. In .this connection I. P. fails to see what all the shooting is about. It is a fact that if the splicing operation be done properly with the correct cement, it presents no more of a problem than does nitrate film—which is to say, none at all.

Let's get this acetate splicing matter straight:

The ordinary nitrate cement *will not* securely bind acetate to acetate. Some of the nitrate cements, however, will bind acetate to nitrate. At least two cements —Rosco All-Purpose and Film-Weld— will effectively bind acetate to acetate, nitrate to nitrate, and acetate to nitrate.

No cement of whatever type will effect a secure splice if the workmanship be sloppy: that is, if the film be not scraped down over the *entire* width of the splice on both ends, if the cement be not evenly spread over the entire splice area, or if insufficient time in the splicer be allowed.

Razor blades are not an efficient scraping tool, even for nitrate stock, not only because they frequently rip the edges of the film but because it is practically impossible with a blade to remove the emulsion to the same depth across the entire splice area. What is really efficient for this job is a scriber so attached to the splicer unit itself that it permits even pressure across the entire splice area and is not dependent upon uneven hand pressure. This arrangement is featured in several modern splicers.

Secure Splices No Problem

Splicing acetate or any other film is simplicity itself—nothing to it. First, scrape evenly *both* sides of *both* ends of the film across the *entire* splice area. Apply the cement evenly across the entire splice area on *both* ends. Let the splice remain in the splicer at least *two* minutes, being sure that ample pressure is being exerted. *Don't* pull and tug on a

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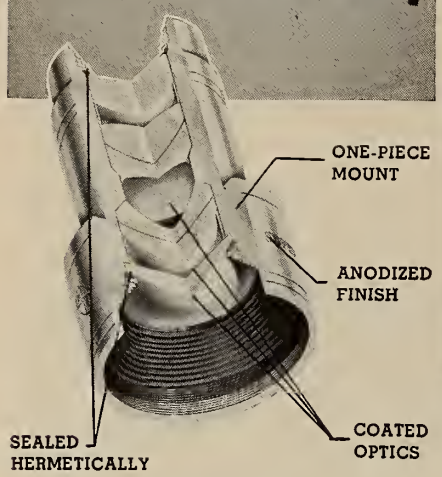
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freshly-made splice; the projector will exert enough of this strain on the run. *Don't* moisten the film with water.

Try to visualize just what is happening when film is joined to film: in effect one film base is being *fused* into the other, much in the manner of mixing several liquids in a glass. Just try to paste a piece of highly coated paper to another using ordinary muscilage. It's no go, because the smooth surfaces don't fuse into each other. A special kind of bind, rubber cement, is indicated for the job; and it's the same for different types of film.

With coated paper a certain amount of roughening of at least one of the sheets provides a surface that can be *gripped* by the other sheet. For the same reason a tool that would not only scrape film smoothly but also roughen the base a bit would be very beneficial.

Blank Film Inserts N. G.

There is no justification for some of the temporary expedients for splicing acetate film cited by certain correspondents in our "Letters" department. Not only has the craft been put on notice relative to the circulation of acetate prints, but it has been told specifically which acetate prints (Trucolor) to watch for during the balance of 1947. The use of blank nitrate leader inserts in an acetate print is permissable as an emergency measure, but the resultant flash on the screen certainly is not good projection practice. Why resort to such methods when the situation may be met simply by the purchase of the proper cement? Get it—today.

Projectionists need never be in doubt as to what type of print they are handling. All release prints, irrespective of manufacturer, are edge-marked every foot or so throughout the print. This is the answer to the baffling indecision of both American and English projectionists who wonder as to the type of print it is *after* they have run it.

Focusing a Compromise

Regarding focusing difficulties reported by projectionists, it is impossible to attain the same sharp focus with Trucolor, Cinecolor, Magnacolor or any other double-emulsion film as is possible with single-emulsion prints. It is doubtful that the average moviegoer will be aware of this slight deficiency in focus. It is necessary to compromise the matter, however, and to this end another focus positioning nick should be made on the lens barrel after testing has disclosed the most desirable positioning.

I. P. will endeavor to keep the craft abreast of all developments relative to the use of acetate film stock, particularly with reference to any sudden extension of its use for release prints.

PERSONAL NOTES

With the addition of three new sales representatives, Ampro Corp., of Chicago, manufacturers of 16- and 8-mm projectors, is continuing its sales expansion program designed to give dealers more intensive assistance. The new appointees are James J. Graven, Central division, George I. Schectman, Mid-West division, and Lou H. Walters, Southwestern division.

Best known of the trio to the professional projection field is Lou Walters, who has



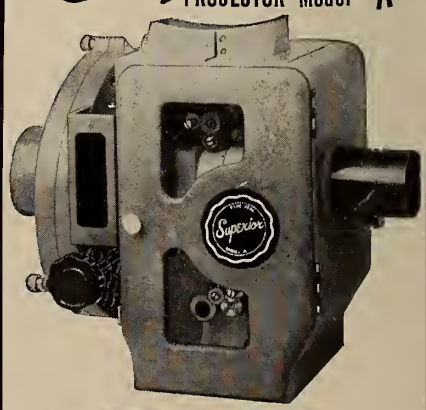
Graven Schectman Walters

been 38 years in the industry, 10 of which were spent with the Lears Theatre Supply Co., St. Louis. He joined National Theatre Supply Co. in 1926, and in 1945 he headed Cine Supply Co., St. Louis, an RCA agency. He has been an active SMPE member for many years.

* * *

Dick Brady has retired after 41 years of service for Eastman Kodak Co. in their Eastern motion picture film department in N. Y. City.

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LETTERS TO THE EDITOR

(*Continued from page* 16)

acetate film superior to nitrate film. One of the greatest faults of acetate stock heretofore was its tendency to develop early brittleness, to dry out under alternate hot and cold temperatures, and to shrink irregularly.

In 1945 Tennessee-Eastman Corp. perfected an inhibitor, a phenyl-salicilate which they called "Salol." This agent was used in heavier plastics and proved its value in that it prevented shrinking and warping.

In 1946 two single-reel lengths of a 35-mm advertising-type short were made, one on acetate and the other on nitrate. Whereas up to then the acetate stock used had become brittle enough to be "shot" within three to five weeks, the new type acetate, containing about 1% of Salol, exceeded the life of its companion nitrate short.

The new Eastman acetate film, containing Salol, has a slightly better light-transmission ability than the regular nitrate stock. More than 20 months of "weathering" of the acetate film showed far less deterioration than did a similar strip of nitrate stock.

LESLIE L. LINICK
I. A. Local 110, Chicago, Ill.

To the Editor of I. P.:

Regarding your acetate film articles: I've had several years intensive experience with acetate stock and find no difficulty whatsoever in splicing it with "Film Weld"*, which works fine and does not thicken even with the bottle left uncovered.

I find that the best way to make an acetate splice that will hold is to scrape the emulsion *dry*, not wet. Acetate requires a little more cement to effect a secure bind, so rather than load one end with all the cement I apply a little on *both* ends and clamp it down as quickly as possible. I allow ample time for the splice to dry, *at least two minutes*. An acetate splice just cannot be rushed, and it positively will not bind unless given ample time *under pressure*.

Answering H. C. Benson's statements in I. P. regarding acetate color film, I hold that it makes no difference in terms of focus whether it is acetate or nitrate film. I run color film on acetate stock and get a sharp focus—but. this is with color film that has emulsion on *one side only*, such as Technicolor.

With Cinecolor prints, however, it is impossible to get a sharp focus, regardless of whether it is printed on acetate or nitrate stock. In fact, I've seen sections of Cinecolor prints with a double image.

My opinion is that the acetate stock now in circulation will not stand the gaff as well as nitrate—that is, in terms of heat and continuous runs. Acetate drys up, becoming hard, brittle and dark. I notice also that Cinecolor prints have sort of an amber tinge over-all. There's no question but that Technicolor is tops at present.

JOSEPH A. DE CARO
Mount Vernon, New York

To the Editor of I.P.:

My first experience with acetate film was during the war. We received a wartime short to which I attached a trailer, using nitrate cement. After the final showing, no trouble with splices having been encountered, I proceeded to remove the trailer and replace the original tail.

After several unsuccessful attempts to effect a splice, I noted the edge marking: "Safety Film." Nitrate cement will positively not bind acetate to acetate, despite R. A. Young's letter to I.P. expressing a contrary opinion. Young states that "regular" cement held through a projection run. If he means "nitrate cement," *he* can run such splices, not me.

I have run Republic's Trucolor prints and discovered at once that they were on acetate stock. I experimented with nitrate cement on these prints, being careful to scrape both sides, but it's no go: I may just as well have used water. I agree with Young in that Trucolor, Magnacolor and Cinecolor prints (all double-emulsion jobs) are extremely difficult to focus and do induce eyestrain.

Our theatre manager said that Republic would supply the cement for their Trucolor releases. I haven't received any as yet, but I'm not going to be caught with my cement down: I got my own. All the boys should protect themselves by getting their own supply, rather than depend on Republic.

D. A. GENEMORE
West Newton, Penna.

* Distributed by Larry Strong, Inc., 1438 N. Clark St., Chicago.

Altec Lansing Buys Coast Firm

Altec Lansing Corp. has purchased Peerless Electric Products Corp., manufacturers of fluorescent lamp starters, industrial and radio transformers, and radar apparatus. Peerless will not lose its identity, continuing to do business as formerly.

The purchase will add 30,000 square feet of urgently needed manufacturing space to Altec Lansing facilities, making a total of 85,000 square feet for Altec in Hollywood.

Applegate, Westrex Engineer, Dies

George Applegate, chief engineer for Westrex Corp., export subsidiary of Western Electric Co., died suddenly July 25. With W. E. since 1920, Applegate was an installation engineer for ERPI and, subsequently, managing director of W. E. in Australia.

Applegate was known by and was a prime favorite of thousands of projectionists with whom he came in contact during his ERPI days.

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MONTHLY CHAT

(*Continued from page* 3)

have too much light?" The answer is an emphatic "yes," substantiation of which will be readily forthcoming from the fellows who supervise studio projection rooms and home office review rooms wherein the lenses are invariably stopped down in order to reduce the illumination.

All these things are fully appreciated by competent projectionists, but some of them, oblivious to the law of diminishing returns, just can't seem to resist the urge to boost the amperage as the cure-all for insufficient screen light. We've seen setups utilizing what we considered excessive amperage where the proper alignment of the lamp elements (a simple rod easily available will do the trick), proper matching of the optical units (lens to condenser or to mirror), or the cleaning or replacement of the screen would do the trick easier and, in the long run, cheaper. Not to mention the demonstrated superiority in terms of heat reduction of one rear shutter over the others.

Some of our projection fellows, particularly in large de luxe theatre operations, have gone completely light-wacky and fallen easy prey to the theory that more amperage necessarily means more light. In these spots the cycle runs something like this:

More light being needed the amperage is boosted, sometimes above the rating of the carbon used, and at other times in step with a switch to a higher-rated carbon. This is going to be just dandy, the boys figure—until they discover that the film just can't stand the gaff. Reduce the amperage? Certainly not. They rig up a blower system, attached to the projector. Still too much heat. Reduce the amperage? Oh, no. Then comes the dear, dear heat-resisting, heat-absorbing glass which is inserted in the light beam.

This glass, in combination with the blower, makes everything fine—except that it occasions a 20% light loss in two instances that readily come to mind. Of course, say the proponents of such inanities, the glass reduces the heat by 40%. We question the latter figure, but granted that it is correct, we still view the proposition as one akin to robbing Peter to pay Paul.

After all, film stock can stand just so much heat, the calculation of which is a simple arithmetical exercise. Knowing this figure, easily obtainable from Messrs. Eastman, DuPont, *et al.*, why not start from that figure and ascertain the maximum amperage the film will stand under a given projection setup?

There can be no valid objection to the use of blowers, which, unlike glass, occasion no light loss and over-all perform a very useful function. Many theatres now use such units with excellent results. But interposing glass between the light and the film is another horse altogether.

We notice in technical publications from overseas that in many foreign countries—notably in France, Germany, Sweden and Norway—water-cooling is utilized to effect a sharp reduction in heat at the aperture. In fact, such setups are commonplace in theatres pulling only 100 amps and even less for the arcs. Americans have long resisted the use of water-cooling, for what reason we know not, although many Brenkert effect machines utilize water-cooling to protect the slides.

That this situation will become more involved rather than unravelled is indicated by the recent announcement of a new 9-mm Suprex carbon. We have long recognized the need for a so-called intermediate arc lamp and carbon trim such as will be afforded by this 9-mm carbon; but we suggest that prior to its introduction some practical means of eliminating the ill effects of excessive heat on the film be evolved. Because this 9-mm job pulling 90 or more amps is really going to pour heat on the film.

We're looking forward to receiving 1,187 suggestions as to how best to lick this problem of excessive heat on the film. Although we've been down this road before, we'll willingly take the trip again with the "best minds" in the craft. Let 'em come.

IN THE SPOTLIGHT

(*Continued from page* 28)

Label Committee, paid high tribute to Earl Tuttle of Binghamton Local 396 for his able efforts in behalf of trade unionism.

One of the surprises of the meeting was the resignation (by resolution) of all the officers and their immediate re-election by the casting of one ballot by H. Paul Shay, 10th District secretary. Re-elected to office by the one-ballot vote were Tom Murtha, chairman, and H. Paul Shay, secretary. Also re-elected to office were Arthur Martens, Don Rood, Bert Ryde, John McDowell, Sal Scoppa, and Mike Mungovan, members of the Legislative Committee.

At the close of the meeting all the delegates and I. A. member visitors to the conference were invited to the 40th anniversary dinner given that evening by Utica Stagehands Local 128.

• Driving home from the recent 10th District meeting, we had as a traveling companion for part of the way Frank Peacock, business agent of Newburgh Local 45. Frank is very much "on the beam" and has some excellent plans afoot which will greatly benefit his membership.

• Thad Barrows, former president of Boston Local 182, is recuperating somewhere in his beloved New England from his recent illness. Thad's many friends throughout the Alliance will be glad to learn that he plans to return to work at the Metropolitan Theatre within the next few weeks.

• For many years, Alton Parker Gerrard, business agent of Local 360, Lufkin, Texas (and also a member of Houston Local 279), had been persistently annoyed by a hangnail growing on his big toe. We are happy to report that Alton had the troublesome appendage removed, and late reports indicate that he has completely recovered from his ordeal and has resumed his social activities.

• Dick Hennley, secretary-treasurer of Hollywood Local 165, recently became the father of a lusty baby boy. Dick is doing very nicely, thank you, and finds great compensation for the severe strain he endured in the joys of parenthood.

• Thirty-five years ago, June 14, 1912 to be exact, Dallas Local 249 received its I. A. charter. This was during the administration of Charlie Shay, then I. A. president, and Lee M. Hart, general secretary-treasurer. Eight of the original charter members still are active: James Crosby, John Harden, Phil Isley, H. Gentry, W. E. Kennamer, C. J. Moore, Julius Schafer, and C. E. Rupard; while the others, S. J. Harbour, C. O. Anderson, C. J. Broleter, Alger E. Walker, Herbert Burton, C. H. Bretel, and J. M. Shelton have passed on. These men did a fine job in organizing Local 249 and their successors have carried on in the same splendid fashion.

• *Random notes from Local 623, West Palm Beach, Fla.:* Lincoln A. Gamage, president, spent his vacation visiting his old home town—Boston, Mass. . . . P. I. Truax vacationed with relatives in Memphis, Tenn. . . . Earl F. Wedenkind worked on the M-G-M production, "On An Island With You," starring Esther Williams. The scenes were shot at Biscayne Key, Miami, and the Hollywood staff were greatly impressed with the almost continuous Florida sunshine (according to the West Palm Beach Chamber of Commerce) . . . Lyman T. Crick was a delegate to the 7th District annual meeting which was held in Chattanooga, Tenn. J. W. Cummings, Local 623 secretary, also attended the conference . . . R. H. Johnson, Sr., J. W. Cummings, and C. W. P. Crow are in Jacksonville, Fla., negotiating new wage contracts . . . Angelo Sands, business agent of Miami Stagehands Local 545, was a recent visitor to West Palm Beach . . . Clyde N. Hall, member of Indianapolis Local 194, is the owner and manager of the first drive-in theatre in Palm Beach, and reports capacity business. His projectionists are Local 623 men.



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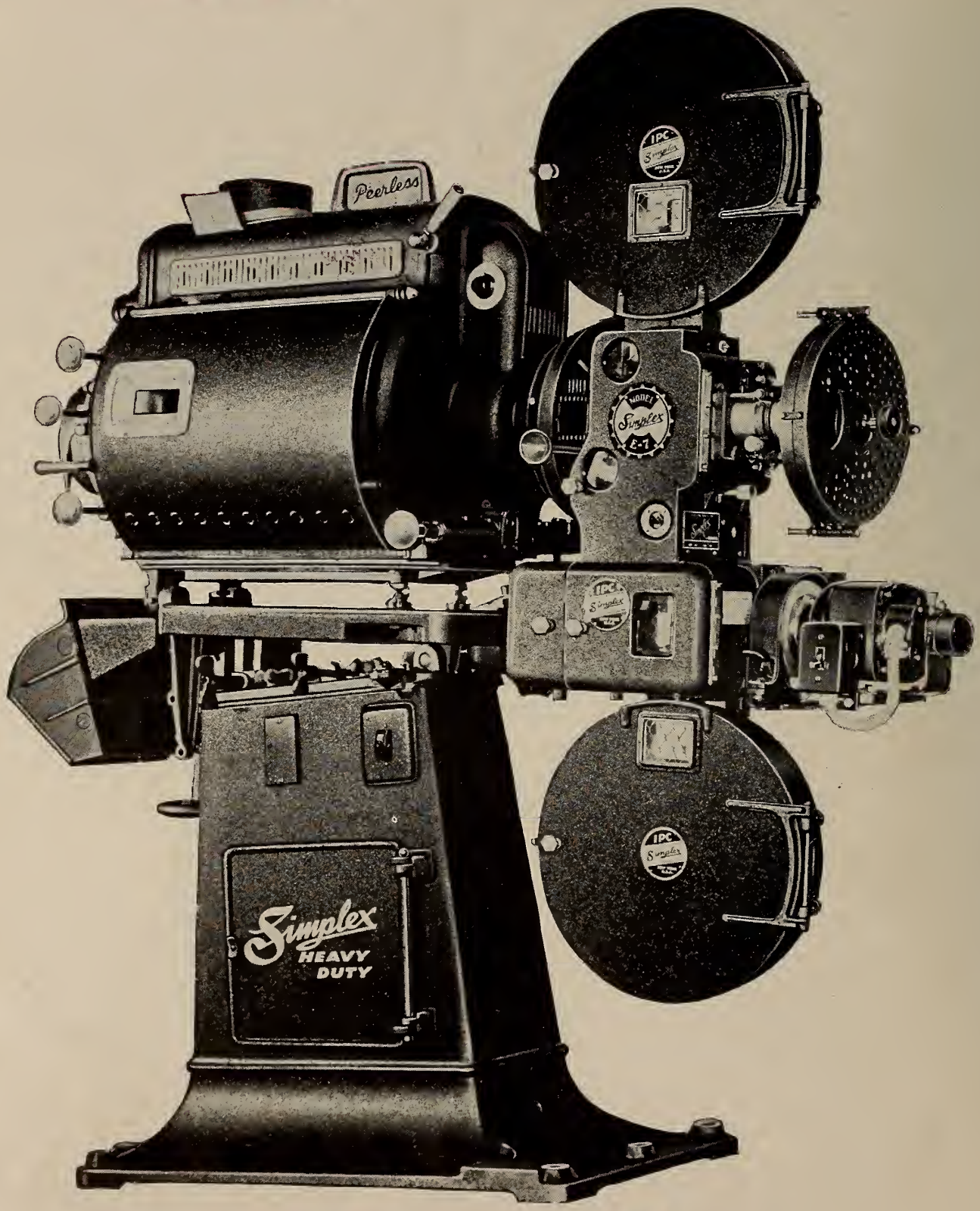
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SEPTEMBER 1947

VOLUME 22 • NUMBER 9

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If you can catch a leprechaun...

A leprechaun, according to Irish legend, is a dwarf who keeps a pot of gold hidden away.

If you can catch a leprechaun, your troubles are over.

Because he keeps his gold just for ransom money. If you catch him, he'll quickly tell you where his gold is, so you let him go.

The best place to look for a leprechaun is in the woods. They're green, and only about nine inches tall, so you'll have to—

Or maybe you don't believe in leprechauns.

Maybe it would be more practical to just keep working for your money. But you can learn one good lesson from these little fellows. A small pot of gold put to one side is a great help when trouble catches *you*.

And there's a much faster and easier way to get your pot of gold than by catching leprechauns. You can buy U. S. Savings Bonds through an *automatic* purchase plan.

If you're employed you can sign up for the Payroll Savings Plan. If you have a bank account you can sign up for the Bond-A-Month Plan. Either way, your pot of gold just saves itself, painlessly and automatically.

And your money increases one third every ten years. That would make a leprechaun turn even greener with envy.

Save the easy, automatic way—with U.S. Savings Bonds

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OCT 1 1947

INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 22 SEPTEMBER 1947 *Number* 9

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MONTHLY CHAT

THE increasing concern of the theatre field about adequate screen illumination is sharply pointed up by the current feverish activity on the part of lamp manufacturers to outdo one another in producing a more efficient arc lamp. And a good job they are doing, too, as a comparison of present arc lamps with those of, say, ten years ago will show.

There really is no sound basis for comparison. Simplicity of operation, ever so much more accurate controls, and infinitely better optics mark the current crop of lamps available for the projection field. The keen competition among manufacturers for their share of the lamp business has certainly redounded to the benefit of the projection field.

Substantial as has been the contributions of the manufacturers, we like to think—in fact, we know—that the projectionist has been a vitally important factor in promoting the advances scored in the lamp field. Not only has the projectionist been extremely light-conscious in terms of quantity of light but he has insisted that that light be maintained at constant intensity on the screen with a mimimum of manual effort.

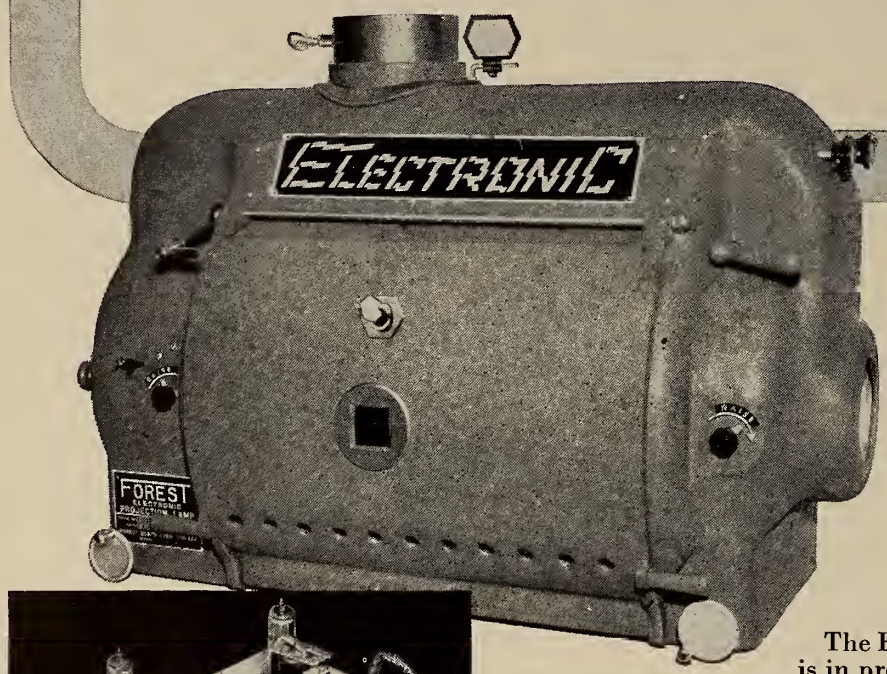
Surely nobody is so naive as to imagine that exhibitors—whether owners or managers—contributed much to this technological advance. These fellows subscribe to the general industry pattern of ballyhoo and false front, tending to water the leaves and neglect the roots. Exhibitors may pay for projection supplies but they contribute little if any impetus to the replacement of the old by the new and better.

This missionary work has been done almost wholly by projectionists, the only technically-minded people about the theatre. No sooner does the projectionist hear about the new and better, particularly in a competing theatre, than he never rests until he knows the what, why and how of the unit. It may take some little time for this information to percolate down from projection room to manager's office, but eventually the trick is done—to the benefit of the moviegoer, the theatre and the industry as a whole.

Evidence of this ever-increasing importance of the projectionist in the theatre scheme of things is at hand in the manufacturers' advertising these days. More and more the trend has been away from the time-worn adjectives such as "best" and "greatest" and "finest" to a forthright exposition of the "what" and "how" of a given equipment. Pictures and copy deal simply but effectively with various components, and the reason "why" a given unit performs as it does is effectively impressed upon Mr. Projectionist.

We think that this is all to the good, a very happy circumstance that pleases everybody—not the least of whom is the manufacturer—and one that enables the motion picture industry to continue its hold upon the American people.

The New FOREST *Electronic* projection lamp



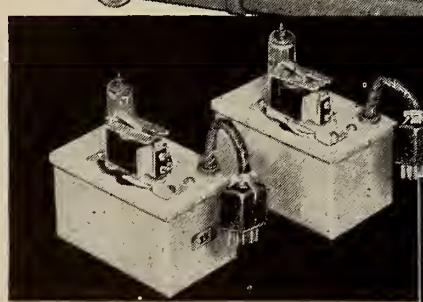
Now Available Quick Delivery

The Forest ELECTRONIC Projection Lamp is in production, available for quick delivery.

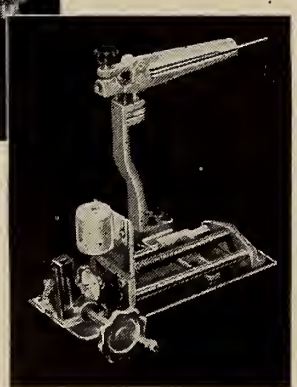
This is the ONLY Electronic Carbon Arc Lamp. It is simple in design, faultless in performance. Carbon feed is controlled electronically. Individual solenoids actuate both positive and negative carbons. A constant gap is maintained, thus making possible maximum brilliance of screen image regardless of the throw.

Unit construction means quick and easy maintenance. Electronic timing of actuating impulses means a steady arc without continual manual adjustment by the operator. Low-cost operation means more profit for the house.

Specify the Forest ELECTRONIC for your next lamp installation.

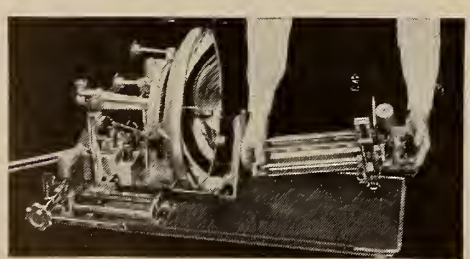


↑ Electronic Timers control production of actuating impulses. These timing units are replaceable in a matter of seconds.



→ Solenoids actuate individual carbon feed mechanisms. Over 300 parts have been eliminated — no fast moving cams, gears or gadgets to wear out.

See Advertisement Page 34 for Data on Rectifiers for Use with the Forest Electronic Projection Lamp.



← Unit construction of entire assembly is demonstrated here. Note simplicity of design and ease of maintenance.

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INTERNATIONAL PROJECTIONIST

VOLUME XXII SEPTEMBER 1947 NUMBER 9

Uniform Screen Illumination as Related to High-Speed Lenses

By DR. JOHN L. MAULBETSCH
Kollmorgen Optical Corporation

In which a noted practitioner of the optical art makes certain observations directed particularly to those purists who hold rigidly to the theory of exactly-matched projection optics.

THE logical question is often asked: "Why use F:1.9 or F:2 projection lenses when the arc lamp is designed for lower speeds?" At first glance it may appear that nothing is gained by the use of a fast lens under such conditions. However, a brief examination of the behavior of the optics in a projection system will show that there is an immediate and definite advantage in the use of a higher speed lens, even though the existing lamphouse, of smaller aperture ratio, be retained.

Figure 1 shows the condition existing when the film is illuminated by an arc lamp having a condensing system (or reflector) of F:2.3 aperture. Angle AOB represents the solid cone of light emanating from a point at the center of the film aperture, and angle A′ O′ B′ a similar cone from a point at one corner of the aperture.

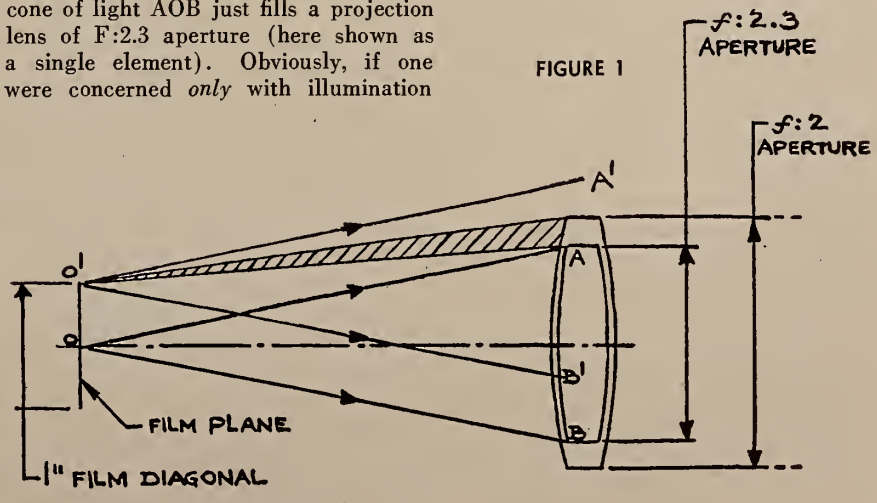
Spot vs. Over-all Illumination

For every point on the film, only that light which is included in such cones, and which passes through the projection lens, can contribute to the illumination of the images of these points upon the screen.

Taking the case of the central point of the aperture, it will be seen that the cone of light AOB just fills a projection lens of F:2.3 aperture (here shown as a single element). Obviously, if one were concerned *only* with illumination at the *center* of the screen, there would be no advantage in the use of a lens of larger aperture.

However, in the case of a point at one corner of the film aperture, it is evident that the conditions are quite different. Only a portion of the light cone A′ O′ B′ enters the projection lens, the remainder being absorbed in the walls of the lens mount. This vignetting effect is quite pronounced, especially when the older,

FIGURE 1



slow-speed lenses are used, and may result in a drop in screen illumination at the edges of the picture of as much as 50%, as measurements have often shown,

For the sake of comparison, a projection lens of F:2 aperture is shown. The hatched region in the light cone A′O′B′ from a corner of the film shows the additional light received by the larger lens and thus delivered to the screen. A gain in illumination at the edges and corners of the screen of as much as 25 or 30% of the central illumination may result, and in any case light measurements along the screen diagonal will show a much flatter curve.

Lens Only One Factor

In addition to affording a more brilliant and pleasing picture, the better uniformity will tend to reduce the appearance of the hot spot at the center of the screen. Similar results will be obtained in the case of projection lamps of lower apertures than the F:2.3 used in this example.

It should not be assumed all projection problems can be solved merely by replacing the lenses. Good projection requires, among other things, an arc lamp affording brilliant and uniform illumination of the film, a projector built to the most precise standards of workmanship, and a screen with the proper combination of reflecting and diffusing properties.

The modern projection lens is designed to work best with modern equipment. On the other hand, where existing projection equipment is serviceable, the replacement of lenses can be recommended where more uniform screen illumination is desired.

The user of the modern projection lenses will find many other advantages, several of them resulting from wartime research. The use of coated optics is probably the most outstanding example. In the case of a six-element anastigmat lens, such as the Super-Snaplite, the coatings increase the overall transmission of light through the lens by about 35%.

One-piece mounts, with optics sealed in place, are made possible by wartime developments of sealing materials impervious to the action of heat and oil. Lens formulae, also subjected to research during the war, have been modified so that high-speed lenses are available to-day with optical definition and flatness of field formerly found only in lenses of lower speeds.

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

III. BEHIND-THE-SCENES MANEUVERS FOR CONTROL

TO INDICATE the general character of work at the de Forest studio the following is taken from notes of Dec. 8, 1924: "A visit was made to the de Forest studio. Reproduction was heard on the de Forest system using the slit arrangement. It was found that their slit was set at about 4 mils. When this was brought down to 1½ mils, the reproduction was very good although the quality was not quite as good as with the focused filament arrangement. A focused filament set-up was made for de Forest, using some lamps made in his factory. In these lamps the filament was held straight by spring tension, being the same arrangement as used in his amplifier tubes. The filament diameter of the lamps used was about ½ mil.

"The reproduction on this focused filament arrangement seemed to be very good. The Vitalux lens was used, and improvement will probably be noticed when de Forest obtains the special Bausch & Lomb 1:1 objective which we had developed.

"Aside from a noticeable improvement in his reproducing apparatus, the situation at the de Forest studio had not changed appreciably. He had made a number of Phonofilms. One, a Christmas number, included a song by Mme. Rappold in a Christmas tree setting, followed by a church scene with choir boys singing, and ending with a trumpet chorus in supposedly a heavenly setting. All of this number was slightly sour and it is doubtful whether or not it could be used commercially."

Jan. 12, 1925: Case devised a slit with cover-glass protection.[42] This was a very important step in making sound recording practical. This slit consisted of a small piece of quartz about 0.25-in. square and 0.04 inch thick. One side was coated with chemically-deposited silver and a slit about 0.001 × 0.120 inch was ruled in this silver coating.

A thin cover glass was then cemented on top of the silver and the cover glass was ground and polished down to a thickness of less than 0.001 inch, including the cement. The slit was then mounted in a steel shoe that could be placed in contact with the film at the camera sprocket. The Aeo light was set close to the quartz slit, thus eliminating the use of a lens to focus the glow discharge on the film and ensuring the maximum amount of light reaching the film.

May 13, 1925: De Forest borrowed the rebuilt Bell and Howell camera from Case in order to make sound pictures of Dr. Elliott in Boston.

Case-de Forest Agreement Ends

Sept. 1925: Business complications terminated the working arrangement between de Forest and Case. Case, having gone this far in the talking picture field, decided to continue the work and finish up some of the technical problems that were still not solved.

During the fall of 1925 the Case Laboratory started building their first sound reproducing attachment. After considerable deliberation it was decided to design this to operate below the projection head, rather than above as had been de Forest's previous practice. This was decided upon for three reasons:

First, it was desired to incorporate a large flywheel that would give sufficient inertia to iron out all inequalities that might be transmitted from the projection head. Second, in the Bell and Howell camera the sound came after the picture, and a better printer design was possible if the sound was not transposed to a position ahead of the picture. And, last, which seemed important at that time, an attachment was wanted that would not run sound films previously made, which in some instances were quite bad.

Sponable laid out this design and supervised local mechanics in executing it. It was here that the industry received its 14½ inch hangover—the sound and corresponding picture were displaced by 14½ inches or 20 frames. This early attachment was very similar in principle and design to the present ERPI type *206*.

Sept. 14, 1925: It became apparent that great mechanical accuracy was required in making the recording camera; this is emphasized by the following quotations from the Case Laboratory records:

"The camera was received back from Bell & Howell on Sept. 12. Tests were begun on this camera Sept. 14. The first test taken was made of voice and piano. When this was reproduced it was found that the camera still had a bad sprocket pulse. The eccentricity of the sprocket was determined with an indicator. It was found that it was running off about 0.5 mil on one end and 0.7 mil on the other. This, together with a noticeable high spot in the gears, was sufficient to account for the pulse observed."

"We tried the shaft alone in its bear-

(*Continued on page* 29)

† J. Soc. Mot. Pict. Eng., April, 1947, p. 275.

[42] U. S. patent. No. 1.605,531.





By the touch of his pencil, Cinderella is transformed . . .

EVEN before she speaks or moves . . . she has put across the character she plays—thanks to the creative pencil of the costume designer.

With it he has touched fabrics and fashions . . . transformed Cinderella . . . given eloquent expression to the role she portrays.

Through artistry such as this, the costume designer has done much to heighten the color, the realism, the drama of the "movie."

And his important contribution has been—and continues to be—all the more effective because of faithful photographic reproduction of the costumes he creates . . . through the industry's extensive use of the large and versatile family of Eastman motion picture films.

EASTMAN KODAK COMPANY
ROCHESTER 4, N. Y.

J. E. BRULATOUR, INC., DISTRIBUTORS
FORT LEE • CHICAGO • HOLLYWOOD

Sound-Film Projectio



By STELLAN DAHLSTEDT

Technical Director, Aktiebolagel Svensk Filmindustri (Sweden)

HABITS and practices vary in different countries in all human activities, depending on differences in race, education and general conditions of life. One would not, however, expect any considerable difference between the northern parts of the United States and Sweden, but certainly there are variances. In Sweden the population is homogenous, with only one race of people, education in general of a high level, the organization of labor and life very extended. I suppose foreigners in general find Sweden a bit over-organized, and probably they are right.

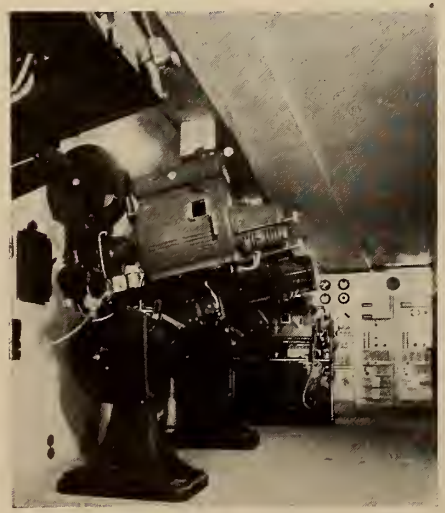
In going to motion picture theatres the Swedish public is apt also to organize its doings. The ordinary theatregoer in Sweden determines in good time which picture he wants to view and which theatre he will attend. Very often tickets are purchased in the morning or in the afternoon for the evening show, or the patron may telephone and reserve seats. This is possible as all seats are numbered.

Only in very small theatres and in newsreel houses are unnumbered seats sold. Of course, the exhibitor incurs higher costs due to the numbered seats, but this is not considered important. On the other hand, the numbered seats insure complete shows at fixed times: thus, the first show generally goes on at 7 p.m., and the second at 9 p.m., making only two shows a day. A few theatres have a regular show also at 3 p.m., and many theatres have an extra children's show at either 2 or 3 p.m. on Saturdays or Sundays.

Fixed Show Times; No Repeaters

There are several advantages in having a fixed time of starting each program. The public becomes accustomed to it and as they usually already have their tickets, they can calmly eat their dinners and appear at the theatre at the right time. As the theatre is cleared out when the show is finished, there is no possibility of any "hangovers."

Bauer projector installation equipped with air cooling. The air compressor unit, built on the projector motor itself, is clearly visible. The sound adapter, painted a light color, is shown between projector and lamphouse. Note effect machine at far end. (Saga Theatre, Stockholm.)



Full house lights are on while the public is moving in or out of a theatre and one is very seldom troubled with people rising and walking in or out of the rows during the performance. One would expect that the time necessary to empty the theatre and to fill it again would be fairly long, but this is not the case, about ten minutes sufficing for a theatre of more than 1,000 seats.

To permit this, of course, exits are separated from entrances, but usually no more exits are used than are prescribed by the fire regulations. The time during which people are entering is usually used to show short advertising pictures, each of about one minute length, which is much more effective than showing advertising stills.

The greatest advantage of the fixed show time, however, is that the spectators always view a picture from the beginning, which enhances the value of the picture and increases the prestige of the trade among all classes of cinemagoers. Up to last season the shows started at exactly 7:15 and 9:15 p.m., but on application from the employes the times were changed to 7 and 9 p.m., respectively. Americans will undoubtedly ask: "Why are moving pictures shown only in the evenings?" The answer is that there are not sufficient people free in the daytime to make shows profitable. The same situation exists in small towns in the United States and elsewhere.

Workers' Organization, Wages

Now I. P. readers may ask: "What has all this to do with the projectionist?" Quite a bit, is the answer.

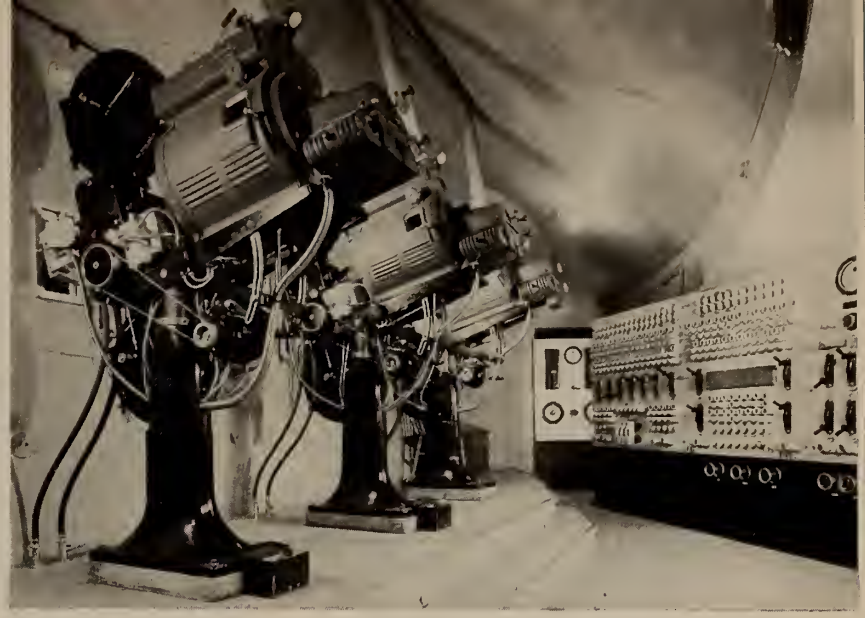
First of all, projection work in Swedish theatres is almost always a part-time job and is paid accordingly. Most projectionists have another job, the majority being electricians or mechanics, but many other occupations are also represented. While they are organized in their respective unions for their regular daytime work, for their work as projectionists in the evenings they are organized in the Swedish Trade-Workers Union (Svenska Handelsarbetareforbundet). Also organized in the same union are the attendants and ticket sellers.

Agreement about salaries and other employment conditions for the whole country are usually made for one year at a time and are printed in a little book-

Complete sound system of Swedish design includes one regular and one emergency standby channel and a control panel with oscillator and oscillograph. (Draken Theatre, Stockholm, 1938.)



n Sweden



An older but most interesting installation, showing belt-driven Erneman projectors and, at rear right, control panels for all power and light in the theatre. Note spaciousness and cleanliness. (China Theatre, Stockholm.)

let. Projectionists' salaries vary in different towns. Best paid are those in Stockholm. The smaller the town the smaller the salary. Thus, the salary varies between 200 and 325 Swedish Crowns a month (approximately $52 and $84, respectively, at the current rate of exchange).

Supplementing this amount is a special addition depending upon the official "cost of living" index which at present amounts to 25.7%. A projectionist working full time—for example, in a preview room of a studio—will get higher salary, say, about 455 Swedish crowns a month (approximately $118).

Swedish movie theatres are generally well equipped and have many automatic controls, which is necessary since most theatres have only one projectionist. The attendants do not perform any technical work. The curtain, or curtains, as well as all lights are push-button-controlled from the projection room. Converters or rectifiers are also controlled by the projectionist. The rewind is in the projection room, and the film is rewound by the projectionist immediately after projection.

The film is stored in oakwood boxes with one compartment for each reel. Oak is found to be very resistive to film fires and does not conduct heat. The use of metal containers is not permitted by the fire authorities. When the film is shipped from a theatre it is wound off the reels in an open roll and packed in a special cardboard box, one box for each roll. Strong Kraft paper is wrapped around the pile of boxes and a piece of thin rope is tied around the package. So packed, the film can be shipped all over Sweden with very little extra weight, since there are no heavy reels or containers.

Arc Lamps, Projectors, etc.

Arc lamps generally used are of the medium size, non-rotating, automatic feed type. The Brenkert lamp is most generally used, but other American lamps and also prewar German lamps are used. Among the latter, the Ikosol-lamp, with a multi-lens condenser, is of a remarkable design. During the war Brenkert and other types of lamps were manufactured in Sweden. Heavily copper-coated carbons from 4- to 9-mm in diameter are used with currents ranging from 30 to 75 amps.

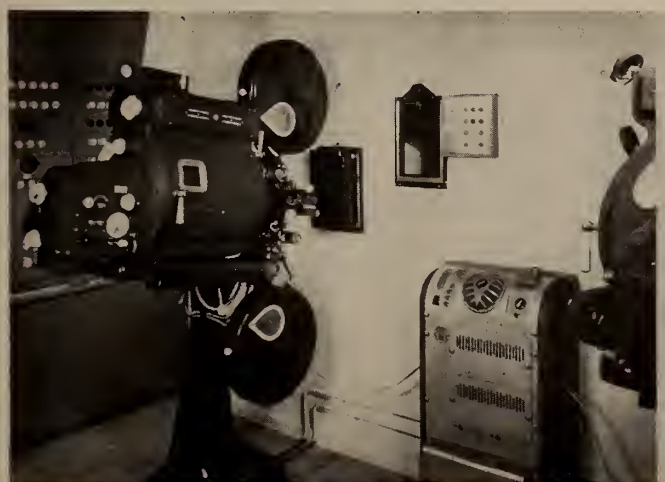
There is no great need for bigger lamps with rotating carbons as the largest theatres have little more than 1,000 seats and the largest screen width ordinarily used is about 8 metres (26 feet).

Occasionally the larger theatres use an arrangement called the "Magnascope," the effect of which is to widen the screen during the projection of big scenes such as air raids or battles. Either the projection lens is changed or a varifocus lens is used, with the screen masking being extended by means of a motor-driven arrangement. Although the light on the screen is insufficient for a screen of such area, the exhibitors feel that this arrangement is useful. The light in the better theatres is more than 100 lux (9 foot-candles) and the general trend is to increase the light to 140 lux.

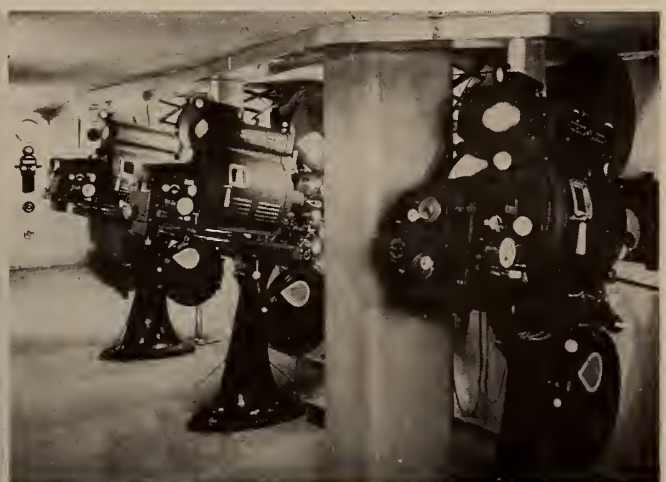
The power source most commonly used for the arcs is the selenium rectifier, which was introduced several years before the war. Although there has been some trouble due to failure and the aging of the selenium plates, their advantages

(*Continued on page* 26)

In the smaller installations the amplifier is often installed between the projectors. The flexible cable to each projector is shown clearly. (Kaparen Theatre, Gothenburg.)



The modern Swedish Aga projector equipped with the Swedish-built Brenkert arclamps. These projectors are water-cooled. (Spegeln Theatre, Stockholm, completed in 1946.)



Sound-Film Projection in Sweden



By STELLAN DAHLSTEDT

Technical Director, Aktiebolagel
Svensk Filmindustri (Sweden)

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Now I. P. readers may ask: "What has all this to do with the projectionist?" Quite a bit, is the answer.

First of all, projection work in Swedish theatres is almost always a part-time job and is paid accordingly. Most projectionists have another job, the majority being electricians or mechanics, but many other occupations are also represented. While they are organized in their respective unions for their regular daytime work, for their work as projectionists in the evenings they are organized in the Swedish Trade-Workers Union (Svenska Handelsarbetareforbundet). Also organized in the same union are the attendants and ticket sellers.

Agreement about salaries and other employment conditions for the whole country are usually made for one year at a time and are printed in a little booklet. Projectionists' salaries vary in different towns. Best paid are those in Stockholm. The smaller the town the smaller the salary. Thus, the salary varies between 200 and 325 Swedish Crowns a month (approximately $52 and $84, respectively, at the current rate of exchange).

Supplementing this amount is a special addition depending upon the official "cost of living" index which at present amounts to 25.7%. A projectionist working full time—for example, in a preview room of a studio—will get higher salary, say, about 455 Swedish crowns a month (approximately $118).

Swedish movie theatres are generally well equipped and have many automatic controls, which is necessary since most theatres have only one projectionist. The attendants do not perform any technical work. The curtain, or curtains, as well as all lights are push-button-controlled from the projection room. Converters or rectifiers are also controlled by the projectionist. The rewind is in the projection room, and the film is rewound by the projectionist immediately after projection.

The film is stored in oakwood boxes with one compartment for each reel. Oak is found to be very resistive to film fires and does not conduct heat. The use of metal containers is not permitted by the fire authorities. When the film is shipped from a theatre it is wound off the reels in an open roll and packed in a special cardboard box, one box for each roll. Strong Kraft paper is wrapped around the pile of boxes and a piece of thin rope is tied around the package. So packed, the film can be shipped all over Sweden with very little extra weight, since there are no heavy reels or containers.

Arc Lamps, Projectors, etc.

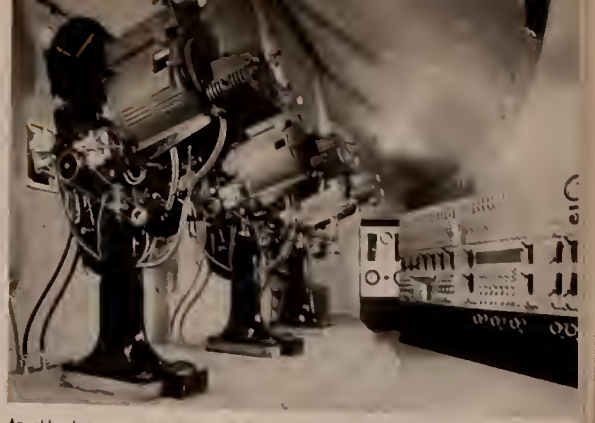
Arc lamps generally used are of the medium size, non-rotating, automatic feed type. The Brenkert lamp is most generally used, but other American lamps and also prewar German lamps are used. Among the latter, the Ikosol-lamp, with a multi-lens condenser, is of a remarkable design. During the war Brenkert and other types of lamps were manufactured in Sweden. Heavily copper-coated carbons from 4- to 9-mm in diameter are used with currents ranging from 30 to 75 amps.

There is no great need for bigger lamps with rotating carbons as the largest theatres have little more than 1,000 seats and the largest screen width ordinarily used is about 8 metres (26 feet).

Occasionally the larger theatres use an arrangement called the "Magnascope," the effect of which is to widen the screen during the projection of big scenes such as air raids or battles. Either the projection lens is changed or a varifocus lens is used, with the screen masking being extended by means of a motor-driven arrangement. Although the light on the screen is insufficient for a screen of such area, the exhibitors feel that this arrangement is useful. The light in the better theatres is more than 100 lux (9 foot-candles) and the general trend is to increase the light to 140 lux.

The power source most commonly used for the arcs is the selenium rectifier, which was introduced several years before the war. Although there has been some trouble due to failure and the aging of the selenium plates, their advantages

(*Continued on page 26*)



An older but most interesting installation, showing belt-driven Erneman projectors and, at rear right, control panels for all power and light in the theatre. Note spaciousness and cleanliness. (China Theatre, Stockholm.)

Bauer projector installation equipped with air cooling. The air compressor unit, built on the projector motor itself, is clearly visible. The sound adapter, painted a light color, is shown between projector and lamphouse. Note effect machine at far end. (Sago Theatre, Stockholm.)



Complete sound system of Swedish design includes one regular and one emergency standby channel and a control panel with oscillator and oscillagraph. (Draken Theatre, Stockholm, 1938.)



In the smaller installations the amplifier is often installed between the projectors. The flexible cable to each projector is shown clearly. (Kaparen Theatre, Gothenburg.)



The modern Swedish Aga projector equipped with the Swedish built Brenkert arclamps. These projectors are water-cooled (Spegeln Theatre, Stockholm, completed in 1946.)



Low-Reflection Coatings on Glass†

By W. P. STRICKLAND
Simpson Optical Mfg. Co.

Known for 50 years, the principle of coating glass to reduce reflections has only been made practical by the developments of the past five years. Today every optical company has facilities for coating, with varying processes employed. The what, why and how of these processes is described in the accompanying article.

THE first telescopes were simple and no thought was given to reflection losses because these difficulties were minor in comparison to the other shortcomings. To increase the speed and quality of various types of lens systems, more lens elements were added, and each additional element decreased the total transmission of the system and decreased the contrast of the image.

It was soon found that there was a practical limit to the number of air-spaced elements that could be used in a lens system without encountering serious difficulties with reflections. This was true with camera lenses and to an even greater extent with the many complicated instruments required by the Armed Services. With each improvement in optical design it became more obvious that the reflection problem must be met and treated.

Mr. H. Dennis Taylor, in 1892, was the first to recognize the need for reflection-reducing films. He and many other investigators tried to treat lenses chemically, with only partial success.

Vacuum Process Introduced

It was not until Dr. John Strong first used the vacuum process to apply coatings to glass that men began to see a practical way of reducing surface reflections. He placed a quantity of calcium fluoride in a small heater and arranged the glass parts above. The assembly was enclosed within a bell jar and the air removed. The calcium fluoride was then vaporized by the heater, and a thin coating condensed on the glass. Other investigators made refinements on the basic idea, and by 1941 the present process was well under way.

The war emergency took hold at this point and in the short space of five years the coating of glass has become an industry. Today, practically every optical company has coating facilities, and uses for the process are being extended.

Now let us look more closely at the low-reflection film. The most noticeable thing about a low-reflection coating is its color. The average individual usually remarks that the coating is purple. It is discouraging to the coating man that the only comment made on his accomplishment is to mention one of its disadvantages. Seeing that the color of the coating is so noticeable to the user, I should like to point out the reasons for this effect.

Figure 1 shows a cross-section view of a coated piece of glass. This glass has an index of refraction of 1.69; and the magnesium fluoride an index of 1.38. The thickness of the coating is one quarter of the wave-length of green light. This amounts to a thickness of about 3.8 millionths of an inch. The wave character of light is represented by the wavy lines.

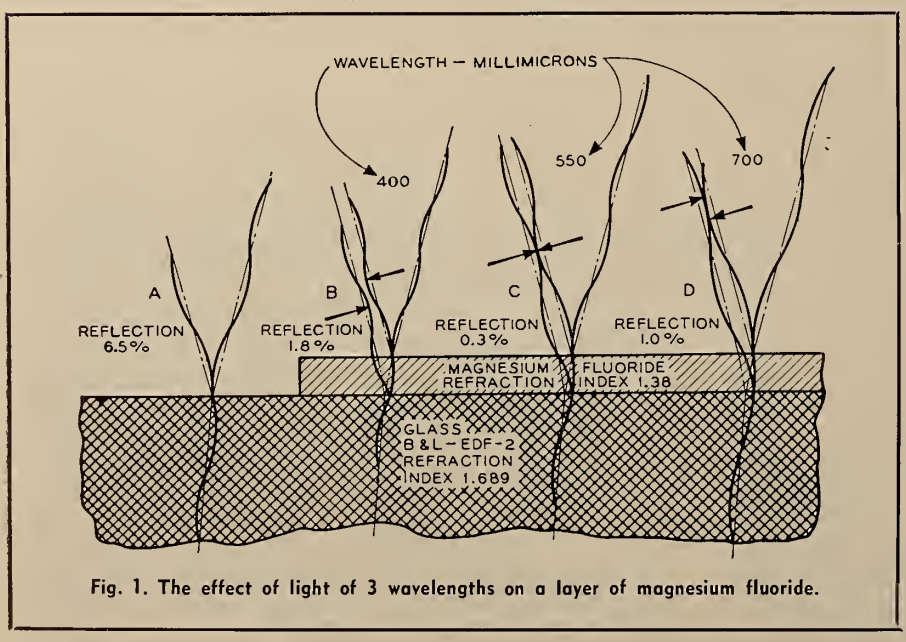


Fig. 1. The effect of light of 3 wavelengths on a layer of magnesium fluoride.

Reason for Color in Coating

In an uncoated piece of glass we would expect about 6.5 per cent reflection per surface, and the balance transmitted as indicated by example *A*. In example *C* the reflected light is broken into two beams of about equal intensity. In this case the thickness of the magnesium fluoride film is one fourth of 5500 A thick.

The beam of light reflected from the glass surface has been made to travel one-half wave-length farther before being reunited with the first beam. The two beams will then cancel each other and the result is a reflection of 0.3 per cent. This canceled light must go somewhere, so it appears in the transmitted beam of light.

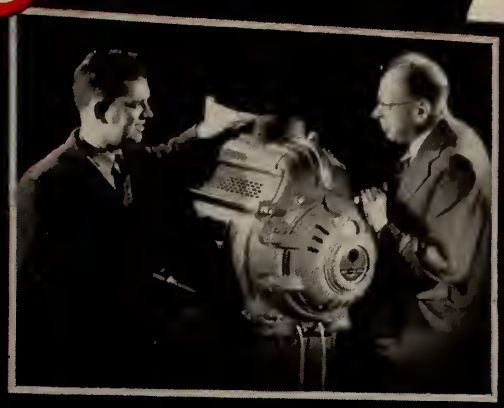
There is another condition that is important in minimizing surface reflections. The two small beams of reflected light must be equal in intensity in order to bring the reflection to zero. In example *C* our result was 0.3 per cent because the reflection from the upper surface was too large. To give zero reflection, the index of refraction of the film must be 1.3.

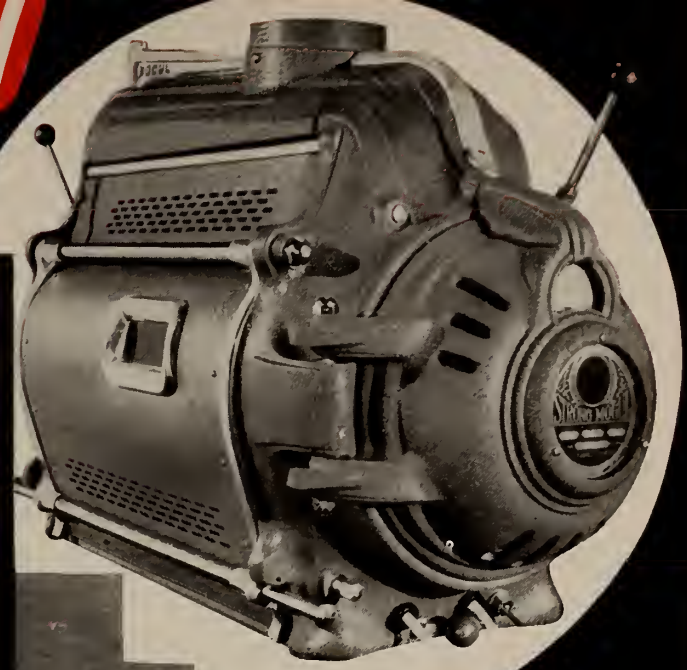
In case *B* we see what will happen to the same coating when violet light, 4000 A in length, is used. The second reflected wave, being shorter than case *C*, will no longer be exactly one-half wavelength out of phase with the first reflected beam. This will result in incomplete cancellation. Example *D* shows a similar condition when red light of about 7000 A is used. The second reflected beam, being longer than the one in example *C*, will result in incomplete cancellation and a reflection of about one per cent.

From these three examples, it is seen

† J. Soc. Mot. Pict. Engr., July 1947, p. 27.

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that the color of the coating is caused by the variation of the wave-length of light found in the visible spectrum.

Main Factors in Coating

There are two main factors that must be observed to reduce reflection to zero. A coating must be produced so that the two reflected beams of light are exactly out of phase with each other. In addition, the two beams must be of the same intensity. If these conditions are not met, incomplete cancellation of light will result.

The surface reflection from an isotropic medium, such as our glass, varies with the index of refraction of the material. To make the two beams equal, it is necessary that the index of the refraction of the coating material be equal to the square root of the index of the glass. Thus, for a glass that has an index of 1.69, the coating material should be 1.3. Unfortunately, there is no suitable coating material with an index of 1.3. If a glass with an index of 1.52 were used, such as common window glass, the film necessary to produce zero reflection should have an index as low as 1.23.

Many attempts have been made to find a satisfactory substitute for magnesium fluoride. Calcium fluoride, strontium fluoride, lithium floride, sodium fluoride, cryolite, and many other materials have been worked on, but failed because of poor mechanical or chemical properties. Magnesium fluoride can be applied to glass in a spongy or porous form. By applying the coating at higher pressures than recommended, spongy films with an index as low as 1.2 can be obtained. These wipe off readily.

Magnesium fluoride has, so far, proved to be the best coating material, when all factors are taken into consideration. To obtain the best results, however, care must be taken in the preparation of the glass and in the methods of application. The glass must be cleaned to remove fingerprints, grease, and even dust particles. Every spot of dust remaining on the lens during the coating process will result in a small uncoated area.

Equipment Relatively Simple

The equipment for coating is relatively simple. A mechanical vacuum pump connected in series with the diffusion pump is required to secure the vacuum. This is connected to the bottom side of a large steel-base plate which has the appropriate electrical connections.

The magnesium fluoride is placed on a small heater and the lenses are arranged about 15 to 20 in. above. A large lens heater is placed over the lenses and a bell jar is placed over the entire assembly, so that it is sealed tight against the metal-base plate. The lenses are heated to approximately 450 F while the pumps are securing the desired vacuum. After the vacuum has reached about 10 - 5 mm of mercury, we are ready to apply the coating.

The magnesium fluoride is heated until it vaporizes, and being in a vacuum it streams out in all directions much the same as light radiates from a lamp. The fluoride condenses on the relatively cool glass in a thin, uniform layer. Any obstruction that might come between the lens and the fluoride heater would cast a shadow on the glass being coated. The thickness of the coating is controlled by observing the color of sample glass arranged adjacent to one of the lenses to be coated.

This, by no means, is the only way to apply low-reflection film to glass. The natural elements produced the first low-reflection films. These were formed by the action of moisture on the less stable glasses. They were usually spotty and very hard, and not so efficient as our present magnesium fluoride.

Many attempts to reproduce these natural films were made by Taylor, Kollmorgen, and Wright. The most successful films of this type were made by Frank Jones, working at Bausch and Lomb. His films were uniform and hard, but not so efficient as magnesium fluoride.

Another chemical method of producing low-reflection film on glass was developed by F. H. Nicoll of RCA. This type depends upon the action of hydrofluoric-acid vapors on glass. This process has advantages over other chemical methods, in that ordinary window glass can be treated in a reasonable length of time. The process can be applied to large plates of glass as well as small. The one disadvantage noticed with this film is that the coating is somewhat uneven. This is not serious, however, and possibly could be overcome.

One of the most remarkable, and indeed the most likely process to challenge the magnesium fluoride, has been developed by Dr. Molton of the American Optical Co. A lens to be coated is cleaned and rotated about a vertical axis at a moderate speed. Several drops of solution are dropped on the lens and allowed to whirl off and dry. This produces a uniform coating on the glass and takes less than one minute.

Severe Tests; Cleaning Tips

The process can also be extended to large plates of glass by dipping them in the solution. These coatings can also be applied by spraying or swabbing. Films of this type are hard enough to apply to eyeglass lenses and come very close to the efficiency of magnesium fluoride. This type of film looks much the same as magnesium-fluoride films and can be washed and cleaned without damage. It is not oil-sensitive and will stand the 24-hr humidity test and salt atmosphere test. The films are attacked by strong alkalis but can resist acids admirably.

Efforts to replace magnesium-fluoride film with chemical films have failed because nothing has been found with the abrasion-resisting quality of the fluoride.

(*Continued on page* 34)

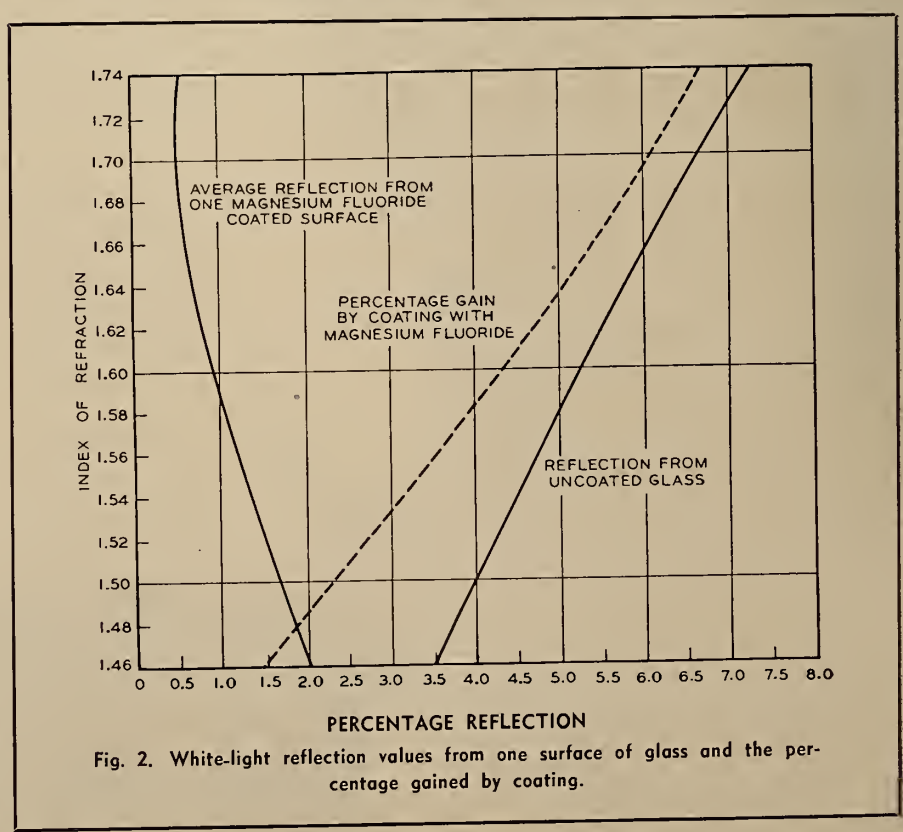
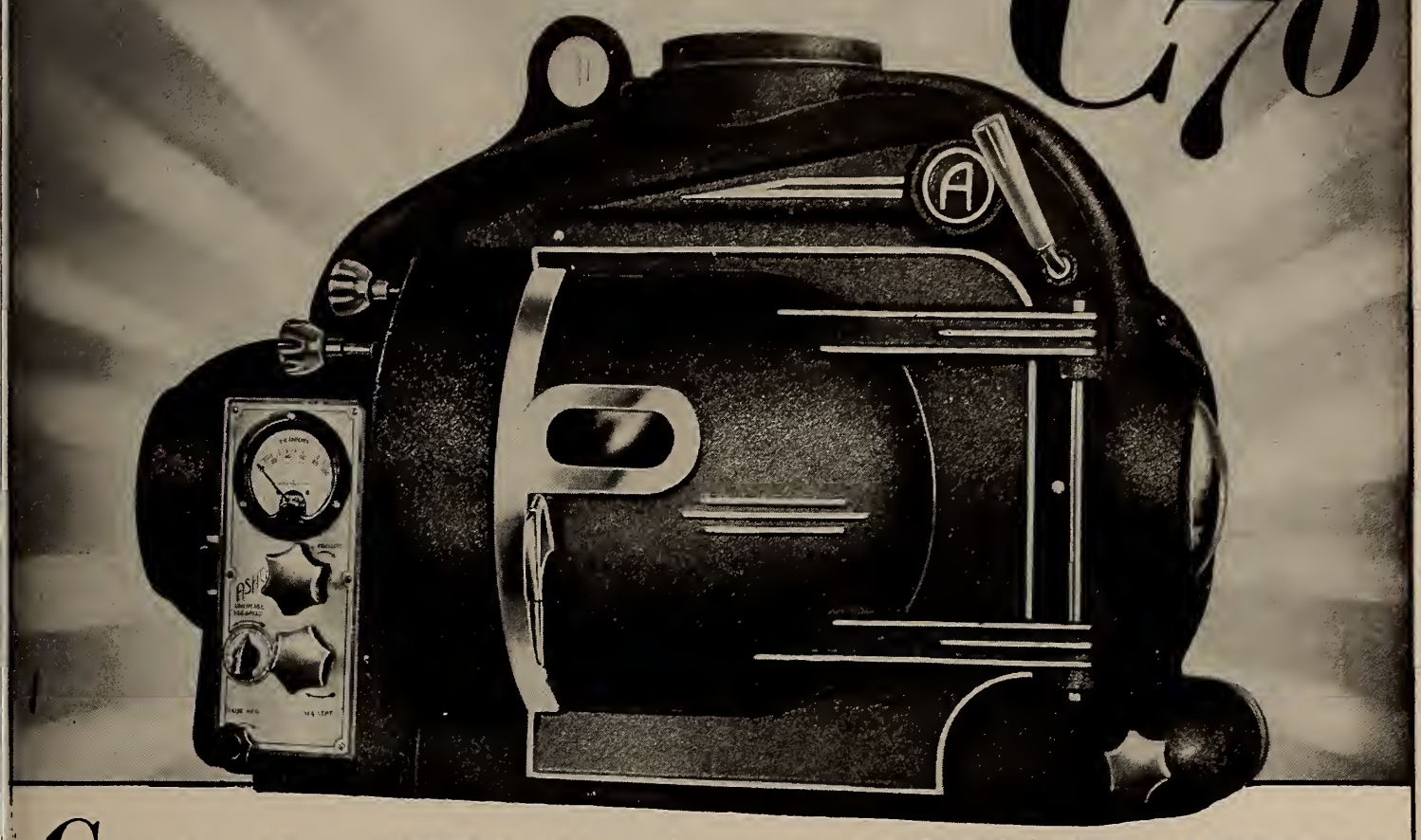


Fig. 2. White-light reflection values from one surface of glass and the percentage gained by coating.

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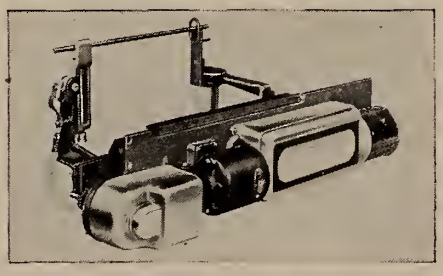
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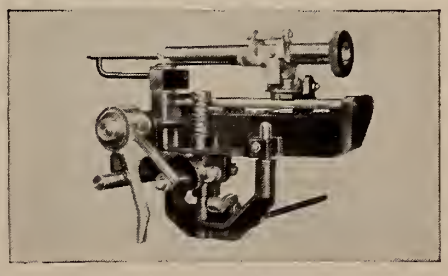
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ACOUSTICS

Sound Intensities—Db Reference Level—Electrical Energy Level—Conversion of Energy—Distance vs. Power—Sound Level Meter—Noise and Noise Levels—Sound Frequencies—P. A. Requisites—Reverberation Data

SOUND equipment can render no better performance than the acoustical properties of the auditorium permit This statement applies to the equipment which originates the sound as well as to the equipment which reproduces it. While equipment designed to meet certain acoustic limitations and deficiencies may be employed to advantage, there is no substitute for good design and careful acoustical planning.

This article is intended to furnish information on such subjects as sound levels and methods of measuring them, the conversion of electrical energy to sound energy, the reproduction of sound frequencies, desirable reverberation time, *etc.* These aspects of acoustics have the most direct bearing on the selection and operation of sound equipment.

The sound generated by any piece of reproducing equipment, such as a loudspeaker, travels in waves—the energy being transmitted from the loudspeaker diaphragm to the first level of air particles surrounding it and to successive levels of air particles in much the same manner as waves are transmitted across water. The amount of energy contained in the air particles determines the intensity of each sound wave and is responsible for the loudness of the sound.

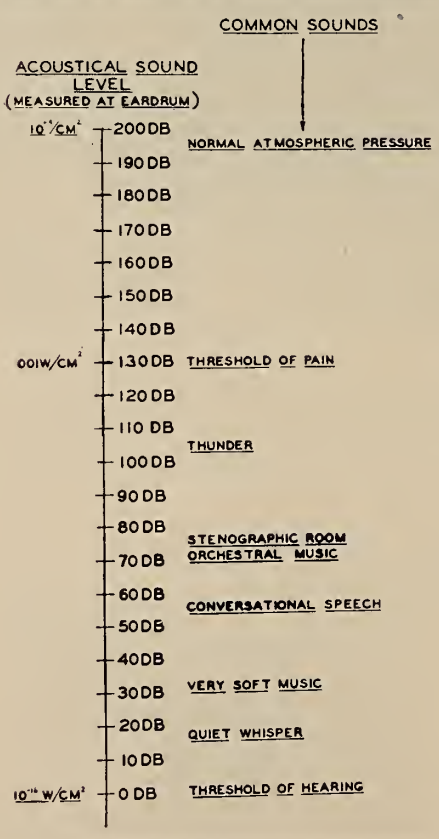


FIGURE 1

The greater the distance or amplitude of the diaphragm's vibration, the greater is the energy imparted to the air particles surrounding it and the louder is the tone emitted by the loudspeaker.

Since the loudspeaker diaphragm is activated by the electrical energy reaching its voice coil, it is vibrating or creating sound energy in *exactly the same proportion* as the electrical energy reaching its voice coil. This sound energy is known as audio or acoustic power and is measured in acoustic watts. Using the acoustic watt as a base, a well defined method for measuring sound intensities exists.

Instead of referring to this evaluation of loudness as an intensity level, it is usually referred to as a sound level and expressed in terms of decibels (abbreviated db).

Decibel Reference Level

The decibel reference level or base has been arbitrarily assigned a standard value of 10^{-16} watts per square centimeter at 1000 cycles, measured at the eardrum. This is an extremely small amount of sound, but loud enough so that the average human ear can barely hear a sound of that intensity. It is sometimes referred to as the "threshold of hearing" or audibility because sounds below it are inaudible to the normal ear, while sounds above it are audible.

This establishes 0 (zero) db as a specific reference level against which levels of sound intensity may be compared or measured in relation to commonly known sounds and in relation to each other, as is graphically illustrated in Fig. 1.

The use of the decibel as a unit of measure of sound energy or acoustic power is thus clearly shown. However, it is not generally realized that the decibel is used to measure electrical power as well as acoustic power. The essential difference is that the electrical db measures energy in the sound system while this energy is in the form of electrical current, the acoustic db measures this energy after it has passed the diaphragm of the loudspeaker (the point of conversion) and has been converted into sound power.

Since the db is also used to measure electrical current or power, its application to the electrical input and output of sound devices is understandable. The phrases *low level, medium level* and *high level* when applied to sound equipment merely define approximate ranges of electrical energy as measured in terms of electrical db.

Also, the gain or loss of a piece of equipment as expressed in electrical db is apparent. If the gain of an amplifier is stated as 35 db, for example, it means that the increase between the input of

This exposition of the fundamentals of acoustics and their relation to sound reproduction is one of the best we have seen—comprehensive yet easily understandable even by laymen. These data constitute one chapter in "The Architects Manual of Engineered Sound Systems," published and copyrighted by the Sound Products Section of RCA, to whom I. P. is indebted for this presentation. A review of this volume appears elsewhere herein.—Editor.



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electrical energy and output of electrical energy is 35 db.

The comparison between electrical db and watts, using .001 watt as a reference level, and in relationship to commonly known sound devices is illustrated in Fig. 2.

[NOTE: A db is sometimes called a volume (abbreviated *vu*). The volume unit is most frequently used in speech input and broadcast transmitter work and is often interchanged with db. Thus, a volume level of + 60 vu is the same as + 60 db above reference level as computed on the standard volume indicator. Whenever the term vu is used, db may be substituted unless otherwise noted.]

Electrical Energy Levels of Sound Equipment

The microphone is the most commonly used piece of low-level sound equipment. The electrical energy transmitted by a microphone is too weak to drive a loudspeaker. It is for this reason that great care must be exercised in shielding microphone lines until this energy can be amplified and converted into sound energy at an audible level. Turntables used to play standard phonograph records and transcription records are additional examples of so-called low-level equipment in the sound system.

Again referring to Fig. 2, it will be observed that medium-level sound equipment falls in a range just above the low-level equipment and includes such units as line amplifiers and driver amplifiers. These amplifiers accept electrical energy from low-level equipment and raise the electrical energy to the point where it may have sufficient power to drive a loudspeaker, but is still unable to drive a large group of loudspeakers and furnish the necessary power to make those loudspeakers heard.

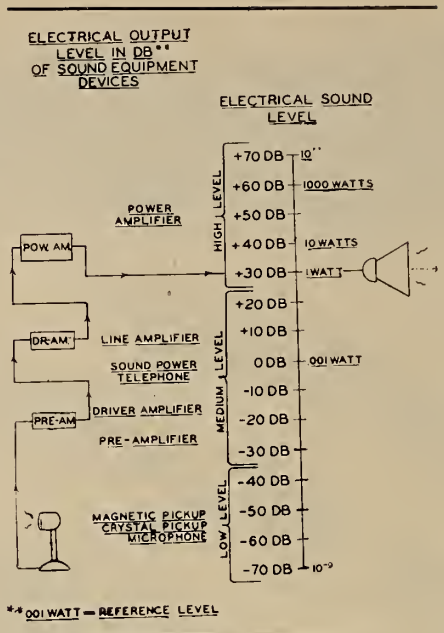


FIGURE 2

Therefore, the electrical energy is taken from the voltage amplifiers into high-level equipment and is increased to a power level sufficient to drive a number of loudspeakers. High-level equipment includes all power amplifiers.

Conversion of Energy

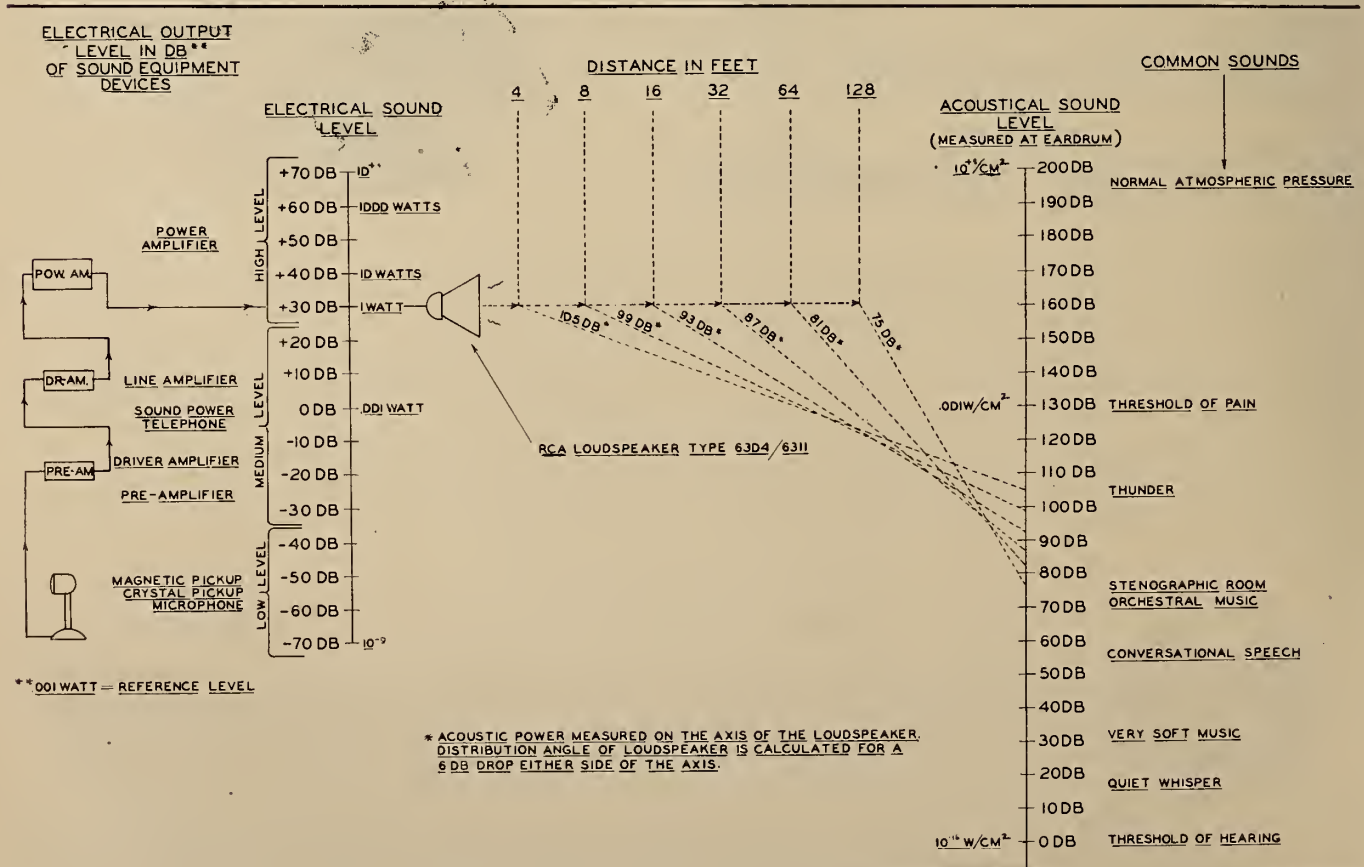
Sound power as measured in acoustic db in relation to common sounds, is shown in Fig. 1. Electrical power as measured in electrical db in relation to the output of ordinary sound devices is shown in Fig. 2. How electrical power expressed in electrical db is transformed into acoustic power expressed in acoustic db through the medium of the loudspeaker is demonstrated in Fig. 3.

In the example shown, the RCA loudspeaker 6304-6311 draws one watt (+ 30 db) of electrical energy from a power amplifier and converts it into sound power which is measured in acoustic db at stated distances from the loudspeaker. Even after making allowances for transmission losses, loss due to dispersion, and the inherent inefficiencies of the loudspeaker itself, at a distance of four feet from the loudspeaker on the axis the sound is heard at a level of 105 db.

At a distance of eight feet from the loudspeaker on the axis the sound is heard at a level of 99 db, or 6 db less than at the four-foot distance. At a distance of 16 feet on the axis the sound level falls to 93 db. At 128 feet, which distance might be typical of an auditorium, the level drops to 75 db, which

(*Continued on page 36*)

FIGURE 3



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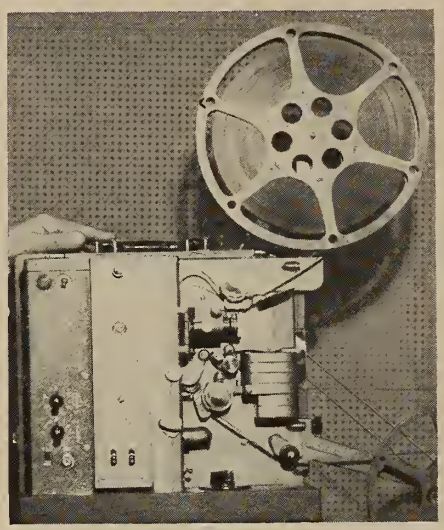
THE distinction of being the first television projectionist in the world would seem to belong to Charlie Kellner, member of I.A. Local 306 and chief projectionist at RCA's gorgeous new Exhibition Hall on West 49th St. in N. Y. City. Some of the boys who fussed about in developmental labs and experimental theatres may challenge this award to Kellner, but the later's record is too impressive to be by-passed.

Charlie joined RCA 20 years ago when the RCA sound system had yet to have its first theatre testing; in fact, the system did not exist as an entity but only as a group of components. Those were the feverish days when RCA, under the direction of Dr. A. N. Goldsmith as chief engineer, set out to challenge Western Electric's long headstart—the days, too, when "interchangeability" was the pressing topic, with W.E.'s variable-density track being reproduced through a slit only one-half the width of RCA's variable-area system.

Kellner has been through the mill with sound-film systems, witnessing all its ramifications down to today when the "impossible" of 1927 is a commonplace of everyday technique.

Wondrous though the show be at RCA's new Exhibition Hall (a "must" for everybody with even the slightest interest in electronics) nothing therein can compete with Charlie Kellner's little domain for the attention of projection people. Apart from the video setup, there is the first utilization of a special RCA PG 201 16-mm projector. This projector may be used for either sound or silent projection, the change-over being accomplished by a small-lever adjustment at the pilot light. This unit is 17 lbs. lighter than previous models.

The PG 201 projects film directly



The new RCA 201 16-mm projector (sound or silent) used in tele setup.

onto an improved Iconoscope of a television camera, which scans the image and translates the light patterns into electrical impulses. Projector and camera are operated from the same power source.

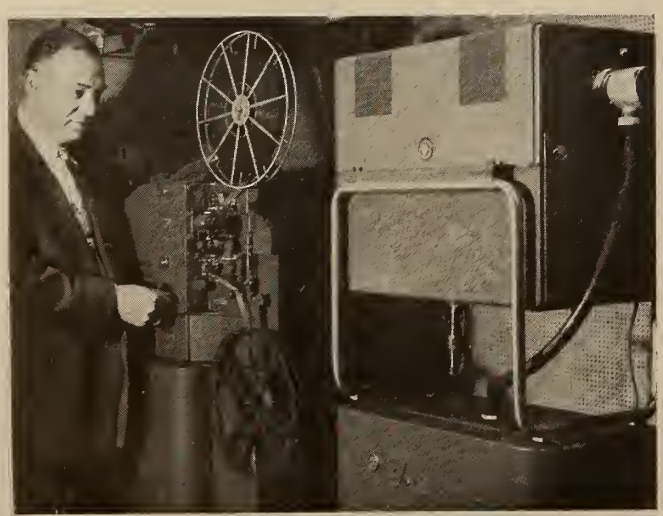
Alternate 3- and 2 Exposures

By an ingenious shutter arrangement, the projector exposes to the Iconoscope one frame of film 3 times and the next frame 2 times, the process being repeated over and over again. Although the projector runs at the standard 16-mm speed of 24 frames per second to permit normal sound pickup, the special perforated shutter insures that there are 5 exposures for every two frames of film, in sequences of alternate 3- and 2-exposures per successive frame.

Thus, while the projector runs at 24 frames per second, in 12 units of 2 frames each there are 12 times 5 exposures, a total of 60, which complements the 60-cycle current and simultaneously satisfies the 30-frame-per-second requisite of the tele camera.

The picture from the camera Iconoscope is fed from the amplifier into a coaxial cable which in turn feeds it to the control center. This center utilizes a switching arrangement whereby the electrical impulses may be fed not only to all the tele receivers in the Exhibition Hall but also, if desired, direct through coaxial cable to the NBC studios in Radio City which may broadcast the impulses to a video network.

Kellner's setup comprises a dream of a little theatre with the very finest appointments. The projection room is the last word in layout and equipment, containing, in addition to the video units, complete facilities for both 35-mm and 16-mm projection.



Charley Kellner, projection chief for RCA, at the controls of the latest film-tele equipment in the first completely equipped video projection room. Film images in 16-mm projector may be broadcast coast-to-coast via tele network.

Latest Exchange Safety Rules

Prominently displayed in all exchanges and other film-working centers of member companies of the Motion Picture Association (so-called Johnston office) are the most recently approved safety measures as promulgated by that organization. The rules, printed in large poster form in two colors, follow:

PROJECTION ROOM

1. No smoking permitted under penalty of immediate dismissal.

2. All film in projection room except that which is in the projection machine must be kept under cover.

3. Room must be provided with fusible link shutters. These must work freely and easily. They must not be propped up or obstructed.

4. Walls and floors must be kept entirely free of every article or object except that which is necessary for actual projection facilities.

5. All lights must be protected by vapor proof globes.

6. All radiators and/or steam pipes must be protected by fireproof guards or coverings.

7. Electric wiring and switches must be kept in good condition. Panel boxes must be kept closed.

8. The device in this department for sounding the fire alarm must be in working order at all times.

9. One 2½-gallon soda acid extinguisher or fire extinguishing devices as required by local ordinances must be provided.

IN CASE OF FIRE

In the event of film fire in a projector or elsewhere in a projection or rewind room, the projectionist should immediately shut down the projection machine and arc lamps, operate the shutter release at the nearest point to him, turn on the auditorium lights, leave the projection room, and sound the fire alarm at once! Screening room must be vacated at once according to fire drill regulations.



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IN THE SPOTLIGHT



By *HARRY SHERMAN*

THE I. A. will conform to the provisions of the Taft-Hartley Bill, which became effective in its entirety on August 22, by filing in Washington the anti-Communist affidavits of its officers, copies of its laws and regulations, and a detailed financial report, it was decided at a regular mid-Summer meeting of the Executive Board at the Copley-Plaza Hotel in Boston on August 18.

The week-long session of the Executive Board coincided with the annual session of the Third (New England) District, thus attracting a record attendance of I. A. national and regional officials.

The I. A.'s decision to submit to T-H requirements in no wise reflects the organization's "acceptance" of the legislation nor does it forecast anything but the bitterest continuing opposition to both the law and to those Congressmen who voted for the law, it was made clear by President Richard F. Walsh in a statement announcing the action, excerpts from which are appended hereto.

On the contrary, the I. A. view is that the legislation is wholly unfair and discriminatory and that it is bound to produce dissatisfaction among not only workers but employers as well.

Members of the Board felt, however, that its action was necessary in order to protect the bargaining rights now enjoyed by the I. A., particularly by those Local Unions whose members are considered to be working in interstate commerce (specifically studio workers, cameramen, and exchange members) and therefore are deemed to be affected by the T-H law. It was emphasized, however, that no definitive ruling relative to the aforementioned categories of I. A. members has been forthcoming.

Walsh Slams T-H Law

"We feel that the Taft-Hartley law as a whole is grossly unfair to organized labor and discriminatory against the trade union movement," said President Walsh in disclosing the Board's action. "It is a drastic attempt on the part of the reactionary industrial interests to use Congress to destroy the labor movement. . . . This law will, in a very short time, result in a reduced standard of living for the workers. . . .

"We believe that . . . this law will not further but will disrupt good labor-management relations. Therefore, we intend to fight the Act in every legitimate way possible, *and to seek the defeat of those members of Congress who were responsible for its enactment.*

"We fail to see, however, how the withholding of financial information and our governing laws, plus the refusal to sign anti-Communist affidavits, will help legitimate trade unions in this fight. On the contrary, to ignore the provisions . . . might further the very objectives of those who want to destroy us.

"Our officers are not Communists and have no sympathy with Communism. . . . The I. A. has been the bulwark against Communist capture of Hollywood studio labor. The I. A. loathes him and everything he stands for. We are convinced that the T-H law will help rather than hinder the Communist . . . to subvert the American trade union movement."

All I. A. representatives have been given detailed instructions anent procedure under the T-H law, with emphasis

DELEGATES AND GUESTS AT NEW ENGLAND DISTRICT NO. 3 BANQUET RECENTLY HELD AT HOTEL BRADFORD, BOSTON.



having been placed on the desire of the General Office to render maximum helpful service.

• Congratulations are in order for Victor A. Welman, secretary of Cleveland Local 160, on his recent marriage to his former secretary, Elsie Berg. Vic's marriage came as a surprise to his many friends in the industry who had him pegged as a confirmed bachelor. It merely proves that you never can tell what will happen to a fellow when that little guy with the bow and arrow decides to take a pot shot at you.



Victor A. Welman

The members of Local 160 turned out en masse at a party thrown for Vic and his bride—a tribute to their popularity with the membership. The newlyweds were presented with a beautiful spinet piano.

• The death of Cecil Wood, Jr., 48 years old, member of New York Local 306 and of the 25-30 Club, broke the three-generation membership chain in the Local, leaving his father, Cecil, Sr., and his son, George W., to carry on. Cecil, Jr., died September 5, following an illness of ten weeks. Prior to that he had been employed for the past several years as projectionist at the Palace Theatre.

Cecil, Jr., was one of the original rebels of Local 306, and took an active part in the campaign to rid the Local of the tyranny that reigned for many years. His efforts to bring to an end the internal strife and restore a democratic rule to the union were rewarded with expulsion. He was reinstated to membership at a later date, however, and up to the day of his untimely death, Cecil, Jr., was one of the Local's most loyal members and an active worker for a more harmonious relationship between the members and officers. His passing will be mourned by his many friends who appreciated his sincere and unselfish efforts in behalf of his fellow workers. He is survived by his widow, father, son and sister, to whom we extend our deepest sympathy.

• Willie Breitenmoser, member of New Orleans Local 293, accompanied Al Johnstone, I. A. representative and business agent of Local 293, to the recent Third District Convention in Boston.

• His first attempt at playwriting brought Tom Loy, director of publicity for the I. A., warm praise from the critics who witnessed the tryout of his play, a comedy, "Something on the Ball," at the Finger Lakes Drama Festival, Ithaca, N. Y., last month. Mrs. Loy, who is also a writer, collaborated with her husband. Well, we can be pretty sure that when Tom's play is produced on Broadway it will be completely manned by I. A. men.

• John F. Cassin, business agent of Local 622, Port Huron, Mich., and former mayor of Port Huron, was appointed to the State Unemployment Compensation Commission by Governor Sigler, of Michigan.

• Many an old-timer in the annals of I. A. history will remember James F. McCaffery, who was secretary of Cleveland Local 27 about a quarter of a century ago. Years back he was a troubleshooter for the General Office and turned in many a fine job. McCaffery, or "Manus," as he was known to his friends, passed on a short time ago at the age of 50, and we were surprised that no mention of his demise was made in any of the trade publications.

• Business agent Elmer V. Moran of St. Louis Stagehands Local 6 recently concluded negotiations with the St. Louis Amusement Co. obtaining contracts calling for a wage increase of $11.25 per week for his members, retroactive to January 14, 1944. Some of the men will receive as much as $2,000 in retroactive pay. Our congratulations to Elmer for a swell job.

• One week after celebrating his 50th wedding anniversary, Jim Whiting, member of Stagehands Local 42, Omaha, Nebr., died from a gall bladder ailment from which he suffered for quite some time. Jim was well-known in burlesque circles, having worked in that end of show business for many years.

• Anthony (Tony) Noriega, member of San Francisco Local 162 and secretary of the Second District, was re-elected secretary of the California State Theatrical Federation at its recent annual meeting. Representing Los Angeles Local 150 at the meeting were the Messrs. Schaffer, Crowley, Stockwell, Pylet and Piper.

Robert Tomsen, member of St. Louis Local 143, is shown with a 70 lb. mango snapper he landed off Port Isabel, Texas, where he recently spent his summer vacation.



• Merle Chamberlin, chief projectionist at M-G-M Culver City studios, is conceded to be tops in his profession, but in golfing circles his rating is—well, the less said the better. In the recent M-G-M golf tournament he qualified as an expert divot-digger and gave the other contenders little cause or worry. Needless to say, the championship honors did not go to Merle that day.

• One of the nicest happenings of the past few weeks was an unexpected visit from our old friend, the perpetual proponent of "Better Projection Pays"—P. A. McGuire, of the International Projector Corp. Mac successfully withstood the searing heat at his retreat in Amityville, L. I., and he promises that with the coming of cooler weather he will be back on the circuit with the same old tried and tested merchandise. Mac's countless friends throughout America—yes, even throughout the world—will be glad to know that he looks fine, feels well and will soon be in evidence wherever projection people gather. This is good news indeed.



P. A. McGuire

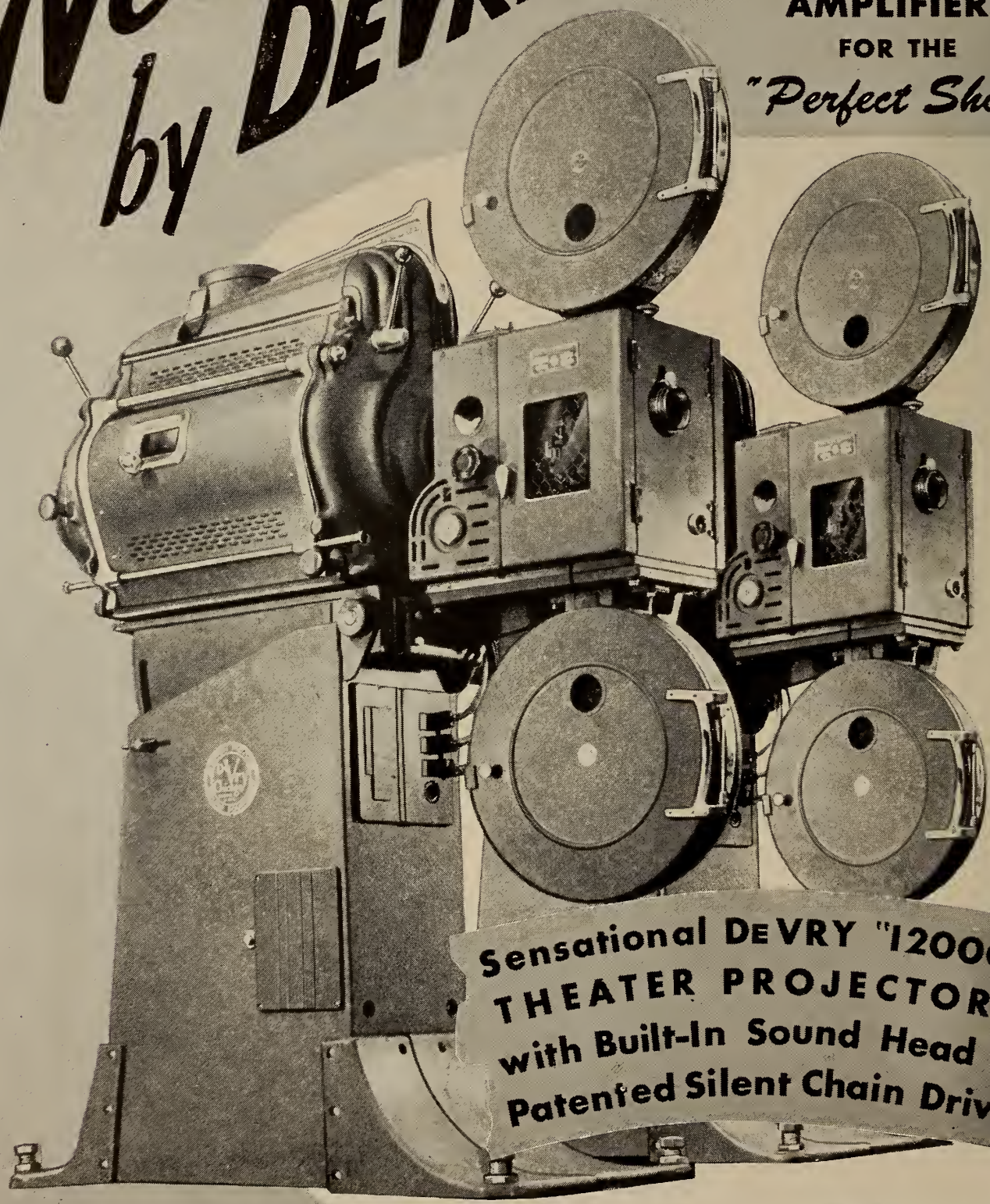
• Lester Van Buskirk, member of Local 744, Cadillac, Mich., and Mrs. Van Buskirk spent their vacation recently taking in the sights in and around New York. It was their first visit to our town and they were delighted with their sojourn here. In addition to his duties as projectionist at the Maltz Theatre in Alpena, Lester is also the official dogcatcher of his town, and if any of our readers contemplate a visit to Alpena and are planning to take their dog with them, we suggest they contact Lester for a clean bill of health.

• During the recent hearings on the proposed revisions in the New York State building code, John Coggeshall, State Labor Department expert, recommended that in the event of a film fire the projectionists leave the projection room immediately, closing the door behind them. Police Inspector Annett, however, disagreed with Coggeshall and proposed that each projection room be equipped with fire extinguishers and that the men should remain in the projection room to

(*Continued on page* 37)

New by DeVRY

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PROJECTORS
AND
AMPLIFIERS
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THERE'S A REASON WHY...

DEVRY has won the favor of Projectionists in many of the World's finer theaters during the past five years, for new and improved projection and amplifying equipment. Put to practical test in hundreds of thousands of trouble-free performances by the Army and Navy, this equipment earned for DEVRY five consecutive Excellence awards—the only manufacturer of motion picture sound equipment so honored. In this equipment DEVRY proved the practicability of the mechanical, optical and electronic innovations now incorporated in its "12000 Series" Projectors and Amplifiers. This "12000 Series" bears a proud name that for 34 years has been in the forefront of motion picture equipment development and manufacture. You are earnestly invited to see DEVRY's "12000 Series" in action—through your DEVRY Theater Supply Dealer or at the actual theater installation nearest you—and to decide for yourself that DEVRY's *the projector pair to draw to for a full house.*



H. A. DeVry

SENSATION of every show at which they have been demonstrated—pride of Projectionists who are already operating them—marvel of Exhibitors who have bought them—DEVRY's new "12000 Series" Theater Projectors and Amplifiers are looked to throughout the Industry for a new high in audience satisfaction. Build your own "yardstick" to measure what it takes to achieve audience satisfaction. Lay this *yardstick* against the specifications and performance record of DEVRY's new "12000 Series."

(1) STAMINA: First on the Exhibitor's projector-purchase *yardstick* is stamina—those *"stand-up"* characteristics that are built into DEVRY's from their rugged, streamlined pedestals to their chrome-plated film magazines.

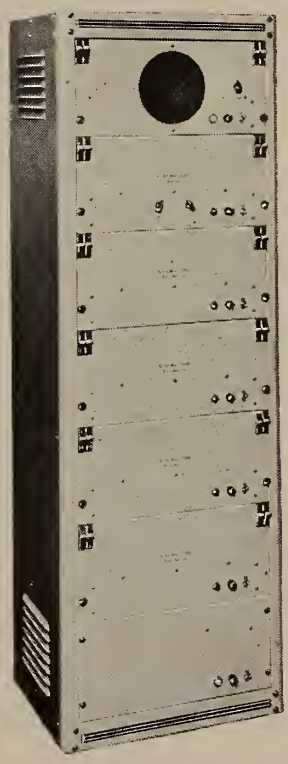
(2) DEPENDABILITY: The new DEVRY is engineered and built by craftsmen whose handiwork took the toughest a Global war could hand out—against a background of years of building precision equipment for the world's finer theaters.

(3) SIMPLICITY & SERVICEABILITY: Designers of the new DEVRY achieved the high goal of all design by eliminating many intricate parts without impairing performance. They went a step farther to incorporate *"unit servicing"*, whereby projector head or amplifier unit may be quickly and *easily* replaced with an auxiliary unit, when necessary.

(4) PERFORMANCE: Goal of the Exhibitor and his Projectionist is the *perfect show*—which DEVRY achieves through the incorporation of both picture mechanism and sound head in one complete, compact unit, assuring projection and amplification that *exceeds* generally accepted professional and scientific standards.

(5) LOW MAINTENANCE COSTS: DEVRY's "12000 Series" equipment is built for quick, easy, low cost maintenance, due to the simplicity and *accessibility* of all moving parts.

(6) PRICE: Moderate cost of "12000 Series" equipment makes it possible for any Exhibitor to enjoy the many advantages of *new* as against rebuilt units . . . enables neighborhood and small town Exhibitors to buy the same deluxe projection and sound facilities preferred by the world's larger and finer theaters.



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—•—

Illustrated is DEVRY's "12000 Series" 80 Watt Amplifier—built on the easy unit-service and replacement basis—utilizing four 20 watt power amplifiers—wired to enable Projectionist to use 20—40—60 or the full 80 watts as needed. Built-in, self-powered monitor speaker, electronic equalizer panel, separate wide range high and low frequency response controls.

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1115 Bay Street, Toronto 5, Ontario

The New Ashcraft C-70 Suprex Arc Lamp

By CLARENCE S. ASHCRAFT

UNCONVENTIONAL design embodying wide current range, high efficiency, simplicity of both mechanical and manual operations, compactness, unit construction, the positioning of all mechanical and manual controls outside the lamphouse, and long life characterize the new Ashcraft C-70 Suprex projection arc lamp. Among the features of this lamp are:

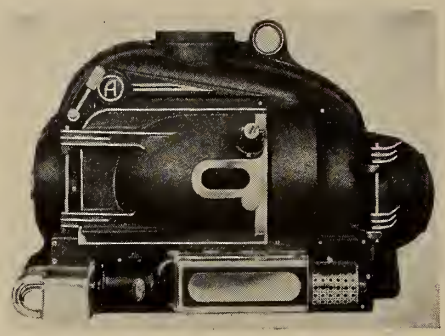
Wide range—40 to 65 amps current capacity; unit construction—a compact mechanical element which simplifies operation and servicing; exterior controls—all mechanical and manual controls are *outside* the lamphouse; dual feeding means—both positive and negative carbons are fed independently by separate feed screws.

Optical excellence—so designed for a 14-inch mirror as to match perfectly the new fast F:2 lenses; modern housing—solid cast aluminum instead of the conventional sheet metal; compact control panel—all manual controls and an ammeter on one panel of high visibility on the operating side.

Novel arc stabilizer—a simple yet positive-acting steel loop which replaces the behind-the-reflector magnet; arc imager—visible from any viewing angle; precise carbon positioning—means for both horizontal and vertical alignment of negative carbon; non-slip duplex clutch—eliminates pawls and ratchets, locking positively after each feeding cycle; non-wearing, oilless shafts—full ball-, roller-, and self-oiling bearings throughout; unobstructed lamphouse—no rods, pans, wires, etc.

Reserve Capacity; Dual Feed

Reserve current capacity as represented by the range from 40 to 65 amps is a necessity today in view of the steadily increasing number of color films, and even the smallest theatre cannot afford to be without this protection. The 1 kw



Exterior view of Ashcraft C-70 lamp, showing compact grouping of all mechanical parts in a single element wholly outside of housing.

lamp has a very limited range (40-42 amps), it is not adaptable for the new fast lenses, and its single non-variable-ratio feed screw requires constant manual adjustment.

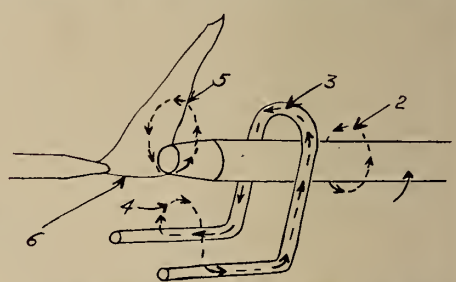
Nor will even a larger capacity lamp suffice to cope with changing conditions. The critical nature of the Suprex-type arc requires the combination of precise control and efficient optics. Single feed screw lamps are incapable of precise control; and it is hopeless to attempt to match a fast lens with a slower mirror. The speed of the slower unit determines the over-all optical efficiency of any arc lamp.

Utilizing separate feed screws for individual control of the negative and positive carbons, the Ashcraft C-70 features a radically new duplex clutch. Two extremely accurate triplex roller clutches are mounted on the feed shaft: one oscillates and feeds the carbon forward; the other locks positively and prevents even the most minute slippage in the predetermined feeding rate of the oscillating member. All six rollers (three for each member) are ground to a tolerance of 1/10,000 inch and are hardened to resist wear. An unlimited number of feed ratios are available through finger-tip control.

Unique is the means employed for arc stabilization. Avoiding the behind-the-reflector magnet, the C-70 utilizes a steel loop which, mounted on the carbon guide, surrounds the positive carbon. The ends of this loop are bent under the arc a distance equal to the protrusion of the carbon through the guide. This loop, magnetized only when the arc is burning, collects the magnetic flux encircling the positive carbon and, through induction, exerts an upward magnetic force on the gas ball at the end of the carbon. This magnetic stabilizing force is exactly proportional to the current flowing in the arc.

All Controls Outside Housing

The term "unit construction" as applicd to the C-70 means that the entire mechanism—motor, gears, shafts, rheostats, etc.—are contained in one compact element positioned outside the housing. The covers of this unit may be easily removed for inspection and cleaning. Removal of the entire mechanism from the housing is readily accomplished in a few minutes. There is practically nothing within the lamphouse proper except the carbons and



C-70 arc stabilizer: positive carbon, 1, extends thru loop, 3. When arc is established, a magnetic flux, 2, encircling carbon is collected by loop which, thru induction, exerts magnetic force at its ends, 4, which forces upward the gas ball at end of carbon, 5. This prevents flame from enveloping end of positive carbon.

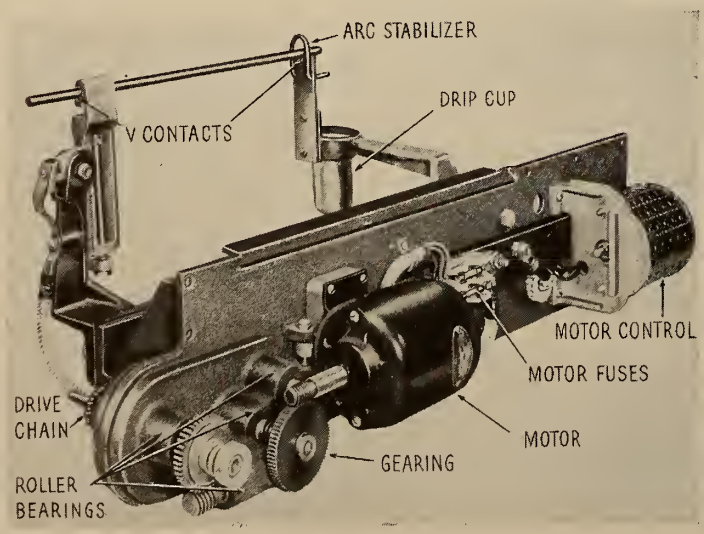
Magnetic force may be increased by bending loop ends toward arc. Ideal arc is when lower edge of flame is a straight line, as at 6.

their holders, a drip cup, and a small steel stabilizing loop.

All manual controls, too, are outside the housing, mounted compactly on a panel which clearly indicates each control. This panel also, mounts an ammeter. Carbon lineup and adjustment, both vertical and horizontal, is quickly done not by tilting the carbons but from the control panel. The arc imager is visible from any viewing angle.

Requiring no oiling for many years, the C-70 utilizes ball bearings on the high-speed shaft, roller bearings on the medium-speed shaft, and a new oil-impregnated bearing on the oscillating and low-speed shaft. This latter bearing actually lubricates itself from within, being a highly compressed powdered metal impregnated with sufficient lubricant for its lifetime.

The solid cast aluminum housing, including doors, has obvious advantages over the conventional sheet metal type in



Complete mechanical assembly of C-70 lamp (covers removed) which is wholly outside the housing. Also shown are burner element, including arc stabilizer.

SMPE Theatre Engineering Conference October 20-24

THEATRE operation in all its many-sided aspects will dominate to an unprecedented degree the proceedings of the forthcoming 62nd SMPE Convention at the Hotel Pennsylvania, N. Y. City, Oct. 20-24, inclusive. Emphasizing this fact is the designation of the meeting as a Theatre Engineering Conference, intended primarily to effect a closer relationship between the Society and the exhibition field.

Engineer-Exhibitor Contact

"The Society has never had the recognition from the exhibition field which its accomplishments through the years so richly merit," said James Frank, Jr., chairman of the local arrangements for the Convention. "Of course, this is not too difficult to understand," continued Frank, "because the work of the Society has been largely concerned with intricate technical matters only the end result of which in terms of theatre performance would impinge themselves upon exhibitor consciousness.

"In the interest of effecting a closer liaison between the Society and those whom it has served so handsomely through the years, however, the forthcoming Theatre Engineering Conference was no accident, but rather was it deliberately planned so as to help knit a closer engineer-exhibitor understanding."

The tentative program for the Conference would seem to bear out Frank's contention. Among the topics slated for extensive and, it is hoped, exhaustive discussion include theatre television (2 sessions); noise isolation, acoustics, safety considerations, lighting—both projection and auditorium. Drive-In jobs, pre-fabricated theatres, auditorium design, ventilation, and general furnishings.

It is expected that Erwin Geib's Screen Illumination Committee will make available a preliminary report on an extensive survey of screen lighting practices which has been underway in 25 cities during the past several weeks.

One of the most interesting sessions from the projectionists' viewpoint will be an open forum on Friday afternoon, Oct. 24, at which screen lighting and theatre television will be discussed by, among others, supervisors of projection and sound for four of the largest theatre chains in the country: Frank Cahill, Warner Brothers; Charles Horstmann, RKO Theatres; Lester B. Isaac and M. D. O'Brien, Loew's Theatres, and Harry Rubin, Paramount Theatres. The known variance of opinion on the topics to be discussed among these supervisors insures a bang-up session.

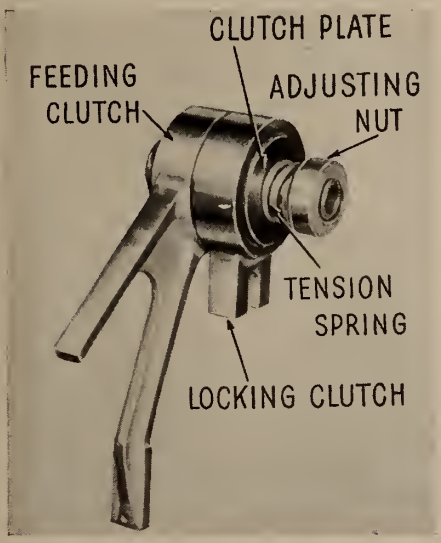
The two video sessions will consist of the open forum already mentioned plus an exhibit and demonstration of all types of tele equipment from the early days of the art down to the very latest current units.

Bill Kunzmann, perennial SMPE Convention Chairman, emphasizes the fact, however, that the Conference equipment showings will be in no sense a trade exhibit but rather will be so conducted as to constitute a scientific and educational presentation. Bill cites the continuing hotel room shortage in urging early reservations direct to J. A. Troise at the Hotel Pennsylvania.

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terms of lighter weight, greater resistance to denting and rusting, and general superior durability. The housing is provided with openings for natural draft and requires no forced ventilation or other extraordinary care.

Soon to be on display at independent supply dealers, the C-70 will meanwhile be demonstrated at various trade shows and meetings of technical societies, including the forthcoming joint TESMA-TEDPA convention at Washington. Complete details anent the C-70 are available from the C. S. Ashcraft Mfg. Co., 36-32 38th St., Long Island City 1, N. Y.



New duplex negative carbon feed clutch affords hairline control and renders even minute slippage impossible.

Extensive SMPE Survey of Screen Brightness Standards

One of the most ambitious projects ever undertaken by the SMPE is now under way via the Screen Brightness Committee, which has long advocated the need for comprehensive data relative to screen illumination in many and diverse types of theatres. Starting in August, Committee representatives have now completed extensive tests in 25 theatres of widely differing types in various cities.

No casual effort this, since the tests utilize charts bearing more than three-score questions relating to projector output, screen size, length of throw, screen light intensity at 14 positions, and data pertaining to the physical aspects of and viewing conditions in the auditorium.

Extensive though these present tests are in a variety of theatres, Committee Chairman Erwin Geib stresses the fact that they are of only a "preliminary" nature, with the data derived therefrom to form the basis for planning a really exhaustive series of tests which will be nation-wide in scope.

Check Standards Observance

Standards relating to structure, quality of manufacture and performance are necessary and wholly desirable, Mr. Geib pointed out, but they have neither value nor meaning if they are not observed by a very great majority of theatres. The present and projected tests are intended to plot the percentage of theatres observing approved standards and to guide the Society in formulating further recommendations.



Erwin R. Geib, Chairman, Screen Illumination Committee.

Projectionists throughout the U. S. and Canada are urged to extend the utmost cooperation and every consideration to Committee representatives who may visit their theatres to conduct this investigation.

First Ampro British-Made Units

The first Ampro "Imperial" 16-mm silent projectors made in Great Britain by Kelvin, Bottomley & Baird, Ltd., have been readied for sale. Ampro recently announced the formation of a new British distributing company, Simplex-Ampro Ltd., 167 Wardour Street, London, W. 1, to distribute Ampro projectors in the British Isles and continental markets.

The first Ampro projectors coming off the production line were subjected to many tests and their operation was found to be excellent. While these first projectors contained a number of American components, later units will use 100% British parts.

Ampro's Premier-20, a 16-mm sound-on-film projector, will soon be made in England by the same company.

Projection Data Charts

By ROBERT ALLEN MITCHELL

V. Projector Base and Drive

These forms should be filled out in pencil, not in ink, as changes may be desired later. Enter the most obvious and easily determined facts first; then enter the more detailed data. This chart, one of the most important of the series, requires accurate data to be of any practical value in an emergency.

THERE is nothing in this Form that will occasion any trouble in filling it out. The "number of seconds for the projectors to attain full speed" (section 2) refers to the pickup time. It should be slightly overestimated in order to avoid accidental "blackouts" at changeovers. The pickup time is easily determined if the correct footage number of standard leader which is placed over the aperture in threading is known.

RULE: *To find the number of seconds for a projector to attain full speed* subtract the leader footage number used in threading from 11. Multiply the difference by 7. Divide the product by 11.

FORMULA: n is the footage number of standard leader which is placed over the aperture in threading:

$$t = \frac{7(11 - n)}{11}$$

The correct footage number to thread up on may be calculated if the time of pickup of a loaded projector has been estimated. (This time should be measured in seconds and overestimated just a trifle to avoid slight "blackouts" at changeovers.)

RULE: *To find the footage number of standard leader to thread up on* multiply the pickup time in seconds by 11. Divide the product by 7. Subtract the quotient from 11.

FORMULA: t is the time in seconds in which the projector attains full speed:

$$n = 11 - \frac{11t}{7}$$

If the different projectors have different pickup speeds, they should be equalized, if possible, by adjustment of the motor starting rheostats.

The correct leader footage number to place over the aperture in threading up is the one that allows the picture to reach the aperture of the oncoming projector about one second before the changeover. Since this amounts to only 1½ feet of film, no "clipping" of significant action or dialogue will normally occur.

It is the writer's practice to place the correct footage number over the upper feed sprocket when threading up. Turning the machine by hand in checking the threading serves to bring the number down into the gate.

Under "Remarks" may be included any points not otherwise provided for in the Form - - motor starting rheostats, for example.

DATA CHARTS ⟶

FILM PROJECTION IN SWEDEN

(*Continued from page* 9)

are so apparent that they have been adopted almost as standard. With a no-load voltage of 70 volts the total efficiency is about 80%. The arc current can be controlled through transductor control, and the short-circuit current is not high enough to damage the selenium plates.

German Projectors Predominate

Projectors are generally of German make—Erneman, Bauer or Siemens, A.E.G. These are of excellent quality, and although very little refurbishing was done during the war, there is very little trouble due to projector failure.

Projectors which have been used less than ten years are rare in Swedish theatres. The main reasons for the possibility of such a long service are the relatively short time theatres are open, the careful servicing of equipments and, probably most important, the excellent oiling system of these projectors. The latter differs completely from American practice. The projectors used in Sweden have an oil bath and a circulation pump just as in an automobile, and the projectionist can watch the oil circulating through a glass window. There is usually an oil filter provided in the circulatory system.

Older projectors are belt-driven, but in many installations direct-driven projectors with synchronous motors are used. In the modern projectors there usually are no belts or chains at all, and all parts, even the takeup, is gear- and spindle-driven.

Swedish authorities allow open projectors, thus the film gate is easily accessible for inspection and cleaning. On the other hand, restrictions regarding the projection room proper are very rigid: for example, it is not permissable to use an open projection port, and the exit must lead *directly* into the open air.

Swedish Sound Equipment

Sound adapters are usually of the film-driven type, the rotary stabilizer being the most popular. It is usually mounted between the projector and the lamphouse, but in the latest models of projectors it is built into the projector head itself. During the war projectors of this type were built in Sweden by Aga at Lidingo, the most important Swedish manufacturer of motion picture apparatus.

Sound equipment is to a great extent manufactured in Sweden, including two-way speaker systems. Very often theatres have double amplifier systems (standby) to minimize trouble due to possible failure. There is no definite standard to which amplifier systems are arranged. Often all the amplifiers are mounted in a small rack or case between the projectors; in other instances there is a big rack elsewhere in the room. In most cases there are no pre-amplifiers, but high-impedance cables are connected directly to the photocells. American standards are usually referred to when specifying the *quality* of sound and picture projection, and in the better theatres the equipment generally adheres to these specifications.

The Swedish public is very motion picture-minded and there is an unusually large ratio of theatres to population. In Stockholm and suburbs alone there are 109 theatres having 47,177 seats. There is also a wide diversity of programs. Apart from the Swedish productions, which last year exceeded fifty feature films, an unusual number, most of the Hollywood productions are shown, as well as English, French, and prewar German films.

Occasionally, Italy, Switzerland, Denmark, Finland and other countries are also represented on the programs. All these foreign pictures are shown in the original language with a short synopsis of the dialogue printed on the lower part of the picture.

FORM 5: PROJECTOR BASE AND DRIVE

Theatre _____
City _____
State _____
Theatre Circuit _____

Date _____
Revised _____

Chief Projectionist

1. PROJECTOR BASES

Number of projectors _____
Make & model bases _____
Description _____

Adjustments for vertical and lateral positioning of projectors _____

How grounded electrically _____

Remarks _____

2. PROJECTOR DRIVES

Type drive system _____

Make & model drive motors _____

Number of motors _____

Serial Nos. Motors:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

H.P. _____
Volts (A.C or D.C.) _____
Cycles _____
Phase _____
Speed _____
Is speed variable? _____

Number of seconds for projectors to attain full speed:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

Footage No. of standard leader to thread up on:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

Rheostat speed control
Type rheostats _____

How connected _____

Centrifugal governors:
Make & model _____

How regulated _____

Condenser-resistor motor control cabinets:
Make & model control boxes _____

Serial Nos. control boxes:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

Make & model inductor generators

Serial Nos. inductor generators:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

Vacuum tube motor control cabinets:
Make & model _____

Serial Nos. control boxes:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

Number of tubes per cabinet _____
Type No. tubes _____
Make & model inductor generators:

Serial Nos. inductor generators:
Proj. 1 _____
Proj. 2 _____
Proj. 3 _____
Proj. 4 _____

Drive coupling:
By what mechanical means does motor drive projectors? _____
To what part of projector is drive connected? _____

Specifications of clutches, reduction gears, universal joints, *etc.* _____

Specifications of belts, chains, shafts, etc. _____

Switches & controls:
Motor switches: type _____
Number of switches _____
Where located _____

Fuses: Type _____
Rating _____
Where located _____
Meters _____

Remarks _____

3. SPARE EQUIPMENT

U. S. Solicits Experts' Advice in Sorting German Technical Data

An invitation has been issued to technical societies, trade associations and other private industry groups to cooperate with the Office of Technical Services, U. S. Dept. of Commerce, in evaluating an estimated 500,000 technical documents revealing the details of Germany's wartime industrial technology. The documents, all on microfilm reels and in German, have been collected over the past two years by American technical investigators from the files of major German industrial plants, research laboratories, universities, and government offices. Included are 5,000,000 pages of highly technical data reproduced on 5,000 microfilm reels. These reels are for sale.

Experts who volunteer their services to the project will benefit by being the first to scrutinize the material. They will also be free to publish articles based on the documents in technical journals under their own names, providing that the same articles are also made available for publication in a compendium.

Superior Projector Completely Redesigned

A CLEAN straightforward design which eliminates all unnecessary parts, particularly gearing, marks the reconversion job of the old Superior projector that is now being made by Blue Seal Cine Devices as the Superior Model A. Veteran projectionists will remember the Superior when it was made 25 years ago by Coxsackie Holding Corp., of Coxsackie, N. Y.

In 1941 the Coxsackie people disposed of all rights, patents, tools, *etc.*, to J. Burgi Contner, president and chief engineer of Blue Seal, who had already won an enviable reputation in the sound-film recording field. Redesigning the old Superior head was a "natural" for Contner, as is evident in its present modern features.

Finished in gray morocco, the new Superior A projector features a film side which is very roomy and easy to clean and service. The alcrometer-focusing large lens mount accommodates the new high-speed coated lenses without the use of adapters.

The aperture plate is of one-piece hardened and ground construction. There are two sets of film shoes, also hardened and ground. The upper shoes effectively snub patches, while the lower ones are long enough to hold the film perfectly flat at the aperture. Dual pad rollers are used on both upper and lower sprockets. A combination framing and pilot light is provided.

Drive Means Simplicity Itself

On the drive side the vertical shaft carries the ball-type governor controlling the fire shutter. The rear shutter is driven directly from the cam shaft, eliminating backlash and shutter oscillation. Intermediate and main drive gears revolve on fixed hardened and ground pinions. By removing one screw shaft and gear, the entire assembly may be removed from the frame.

Shafts may be adjusted and locked in position to prevent end play. For replacement, both shaft and gear assembly may be replaced without re-bushing frames. All lubricating is done on the gear side, excepting the intermittent movement. The old reliable oilcan is used for lubricating when and where needed, which is no hardship for the projectionist. All oil cups are painted red, thus will hardly be overlooked.

The intermittent is the star and cam double-bearing type. Any end play in the cam shaft may be easily adjusted. The pad roller arm is a part of the intermittent, while two pad rollers allow the film to move over the sprocket without friction. A fixed film snubber takes the slap out of the intermittent loop and steadies the picture without undue strain on the film. The intermittent may be removed from the frame in a few minutes.

Exceptionally simple to operate and service, the Superior Model A is subject to a minimum of wear. It may be disassembled and assembled with the aid of an ordinary screwdriver in far less time than any other professional type projector. The mechanism fits all standard bases, magazines, soundheads and drives.

The producer during the war of intricate sound systems for the O.S.S., Blue Seal is now housed in its modern building at 5-45 49th Ave., Long Island City, N. Y. Early new additions to the Blue Seal line will be a complete sound system, magazines, bases, and a new selenium rectifier.

New Books Received

The Finest Work of Its Kind

THE ARCHITECTS MANUAL OF ENGINEERED SOUND SYSTEMS—288 pages, 8½ x 11, 49 floor plans, 24 sketches and wiring diagrams, 32 charts, tables and photographs, definitions and American standard communication graphical symbols Post binder in imitation leather cover. Published by Sound Products Section, Radio Corp. of America, Camden, N. J. Price: $5 ($5.50 foreign).

THIS is easily the finest job of its kind that we have seen in an experience ranging over more than 20 years of reviewing books relating to technical matters. No one who is interested even slightly in sound systems, irrespective of character, can fail to be downright enthusiastic about this volume; and for those upon whose daily work the subject matter impinges, it is an absolute necessity.

Comprehensive in the extreme, authoritative by reason of the source of its contents, this volume may be criticized only on the score that its title is a misnomer such as to occasion fear on the part of its advocates that its sale may be unduly restricted to architects.

Complete, Authoritative, Clear

Starting from scratch by presenting definitions and symbols, this volume goes *all the way* in making crystal-clear even to the technically-uninitiated every element of a sound system, their individual and combinative functions, and their integration into a modern building so as to render maximum efficient performance. The chapter headings convey an idea of this volume's comprehensive character:

Definitions and Symbols, The Microphone, The Amplifier, The Loudspeaker, Controls, Studios and Control Room, Acoustics, The Sound-Film Projector, Antenna Systems, and Typical Layouts and Specifications. Instant accessibility to any section is had by means of a colored tab index.

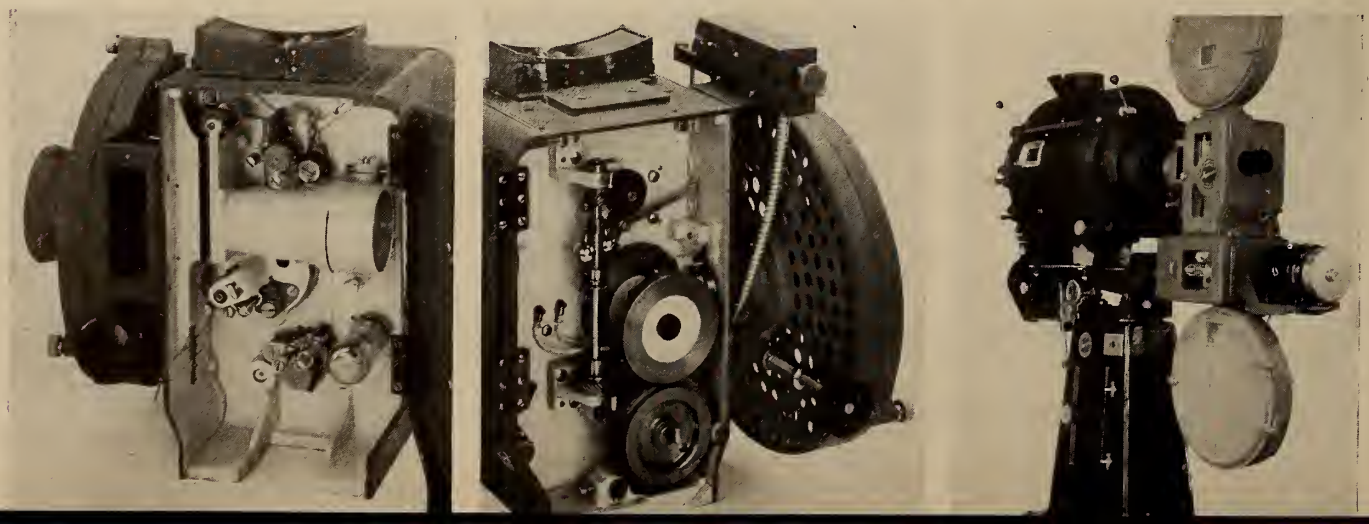
The chapter on Acoustics (presented elsewhere in this issue) is a typical example of the outstanding intelligibility of this volume. As ordinarily treated, acoustics is definitely in the dry-as-dust category, but the RCA technicians have so presented it, without any impairment of technical accuracy or completeness, as to make it of absorbing interest.

Technical book this certainly is, but this phrase is certainly one of the most unfortunate descriptive terms that could be applied to it. Rather is it a book about technical matters, but of such a refreshing nature as to reflect great credit upon its compilers and render it indispensable to anyone interested in sound transmission. We recommend it unreservedly to all workers in the art, and in particular consider it a fine investment for every projectionist organization not only as of benefit to its members but also as a means of effectively servicing and thus building goodwill among its employers.

Kodak Park Daily Water Requisites

To provide the 20,000,000 gallons of water required daily by Kodak Park, Eastman maintains its own water plant and special purification unit on the shore of Lake Ontario. A new suction pipe more than a mile in length and 58 inches in diameter was recently installed to meet even greater demands for fresh water.

THREE VIEWS OF THE NEW SUPERIOR MODEL A PROJECTOR MADE BY BLUE SEAL CINE DEVICES



THE HISTORICAL DEVELOPMENT OF SOUND FILMS

(*Continued from page 6*)

ing and found that it was running fairly true. The sprocket, when tried alone on an arbor running true, was found to be 2½ mils off and also slightly out of round. We made inquiry as to the best machinists around here, and after trying a number of shops, found that Doyle & Wall, 322 Pearl Street, Syracuse, seemed to be the best to do further work on the camera. They are used to working with a tolerance of 0.1 mil and seemed to fully appreciate our problem.

Patent Setup 'Wide Open'

Nov. 23, 1925: "After returning to Auburn, Case went over the patents on sound recording and, after calling Mr. Thompson into conference, it was decided that the field was much more open than we had previously supposed. De Forest's gas discharge patent seemed to be limited to the use of alternating current. Also, it semed questionable whether a court would uphold such patents as the Ries and the Fritts.

"Mr. Thompson was sent to New York to get the opinion of Mr. Gifford, supposedly one of the best attorneys in the matter of patents. Mr. Gifford's opinion in this matter seemed to confirm Thompson's, that is, that the field was open and that no one seemed to have any fundamental patents on the system of talking moving pictures."

Dec. 8-10, 1925: "About a year ago we approached Western Electric Co. regarding the use of their amplifiers or commercial showing of the talking pictures. At that time Mr. Craft advised us to go ahead and use them for this purpose and stated within a few weeks Western Electric would submit a contract to us covering some form of a license agreement. Nothing further happened regarding this agreement at that time.

"Now that we are interested in using these amplifiers for possibly road show work, and having severed connections with the de Forest outfit, E. I. Sponable went to New York for the purpose of seeing Mr. Craft and, if possible, obtaining his O.K. to go ahead with their amplifiers for any commercial work we should want to do."

W.E.'s Fateful Decision

"On seeing Mr. Craft we explained to him the situation and recalled to his mind our conversation of last year. He stated that since that time '*considerable water had gone over the dam*' and that they were now interested in talking moving pictures themselves. Further. that they were negotiating or had completed negotiations with Warners to furnish the latter company with apparatus and technical aid to enable this moving picture firm to produce and market talking moving pictures.

"Considerable discussions of the subject resulted in Mr. Craft's saying that he believed we were further along in the art than they were, and that he saw no reason why both the Case Research Laboratory and Western Electric should not get together and compare their accomplishments and possibly enter into some agreement with a moving picture company whereby both W.E. and Case would benefit.

"He further stated that he would like to send two of his technical men up to Auburn to hear our films and look over our developments. After they had returned and reported to him he would then try to arrange a meeting between representatives of this laboratory and the commercial men of Western Electric."

Keith Interests 'Not Interested'

"Before the call on Mr. Craft, the Keith-Albee people were visited for the purpose of determining whether or not they would be interested in obtaining our talking moving pictures for an act of vaudeville. Mr. Oakford, of the booking department of the Keith people, was given information regarding our systam. He was very much interested in what we told him and stated that he would take it up with men



These grim faces may be your patrons, glaring at your booth—



And this you, when bad-sound refunds wreck a smash-hit run.



RCA Service helps prevent such breakdowns—keeps your sound clear and strong



—your box-office traffic healthy and going the right way.

Smash the Sound-Trouble Bugaboo!

When you buy RCA Service, your sound gets regular check-ups by a skilled technician, with modern instruments to put the finger on danger spots. Your sound and projection get all parts needed for tip-top operation. You get prompt help in an emergency. Stop worrying that sound troubles will hit you where they really hurt. Join the thousands who find RCA Service smashes the sound trouble bugaboo. It will cost you but a few admissions per day.

RCA SERVICE COMPANY, INC.
RADIO CORPORATION of AMERICA
CAMDEN, N.J.

higher up in the company and advise us regarding their interests.

"He reported the following day that he had talked with the vice president of the Keith company and that the latter was very much disturbed to think that he would dare to bring up the subject of talking moving pictures to them again. They admitted that they had been stung on the thing twice, once about 15 years ago where they invested considerable money in stock of a talking picture outfit, and later in certain connections with the de Forest company. The vice president of the Keith company stated positively that they were not interested in talking moving pictures."

Dec. 15, 1925: "In our conference with Mr. Craft last week he intimated that the use of amplifiers in talking moving pictures would come under their public address work and that at least for two or three years we would be unable to use amplifiers for this purpose without the permission of Western Electric.

"In order to check up this point it was thought best to talk it over with Dr. W. R. Whitney of General Electric Co. This was done by E. I. Sponable on Dec. 15. Dr. Whitney stated that the situation was really something that Mr. A. G. Davis (vice president of General Electric) was more fitted to give an opinion on than he. After describing the situation to Mr. Davis, he stated that he believed that the talking moving pictures did not come under the public address work and that at present the amplifier situation was quite muddled, there being almost an endless number of patents in this connection.

"Sometime within the next year they hope to clear this situation by placing all these patents in the hands of the Radio Corp. Mr. Davis stated that he believed we should see Mr. David Sarnoff, president of Radio Corp., and get his opinion regarding our requirements. He very kindly suggested that he would arrange such a meeting for us, and is doing so at the present time."

Case Quality Attested To

Dec. 17, 1925: "Dr Crandall and Dr. Mackenzie of the Bell Telephone Laboratories were sent here by Mr. Craft. They were shown our talking films and all parts of the taking and reproducing system were explained to them in detail."

"We gathered from them that our films were very good. They stated that they believed that in their own recording that their ground noise might be slightly less, but discounting the fact that we were not using as good loudspeakers or telephone equipment as they have they thought our stuff to be remarkably good. They noted the simplicity of design of the camera and projector and commented on the fact that such a design could be readily commercialized."

"We gave them data concerning our photoelectric cells and recording lights. They stated that they would like to order these various devices so that they could determine their constants using their own apparatus at Bell Laboratories."

Jan. 4, 1926: An opinion was received from Mr. Adams, head of the patent department of RCA:

"He stated that due to de Forest's original patent having expired, de Forest now had no more right to use amplifiers or to make vacuum tubes than anyone else, and that the field now seemed to be completely controlled by Radio Corp. as the result of patents held by General Electric and relating to the manufacture of vacuum tubes and their use in various circuits."

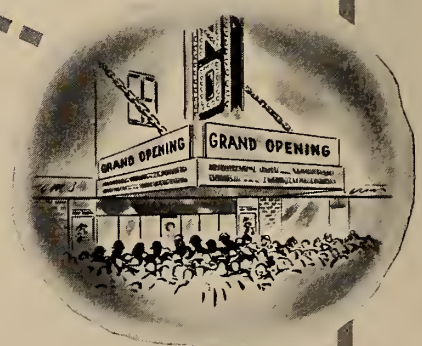
RCA-W.E. Joint Patent Interests

"With reference to whom has the right to supply amplifiers for use with talking moving pictures, he stated that this right rested with Radio Corp., or at least would rest with them when certain patents now under negotiation are finally turned over to them. Further, that he believed from the agreement with Bell Telephone Co. that Radio Corp. reserved the right to use amplifiers in



In 21 of the 28

New Theatres . . .



Of the 28 new theatres described in the 1946-47 issue of Theatre Catalog, 21 are equipped with Bausch & Lomb projection lenses of the Cinephor and Super Cinephor series.

Every theatre owner and manager knows that it's good box office to present a screen image of uniform brilliant illumination, critically defined, easy and pleasant to look at. For all-important *image quality* on your screen, go along with the leaders—specify *projection lenses by Bausch & Lomb.* Bausch & Lomb Optical Co., 616-1 St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.

connection with talking moving pictures for themselves."

Jan. 7, 1926: A meeting was arranged with Mr. Adams and his associate, Capt. Ranger.

"The only new thing which developed was at this meeting Adams reversed a statement which he had made at a previous conference with E. I. Sponable, that is, that both Radio Corp. and Western Electric would have rights to use amplifiers for talking moving picture work. He stated that he would talk the matter over with Mr. Sarnoff and advise us shortly regarding some arrangement for starting a company to handle the talking picture situation.

"Previous to this meeting of Messrs. Adams and Ranger, both Case and Sponable were at Bell Telephone Laboratories to see Mr. Craft. We told Craft that we had checked up the amplifier situation with reference to talking moving pictures and had found that General Electric seemed to believe that they controlled the rights for the use of amplifiers in this connection.

"Mr. Craft then stated that it was really something that both companies had a joint right in, and that in case General Electric should use amplifiers for this purpose, they would possibly have to obtain permission to do so from Western Electric. He further stated that he was anxious to get a report from his men regarding our Aeo lights and photoelectric cells, which they wished to examine."

"We went down to Dr. Crandall's office where we saw the Western Electric system of film recording. Inasmuch as our visit was rather unexpected, they seemed to have considerable difficulty in getting their apparatus to work properly.

W.E. Show Not Impressive

"The showing which they made during this exhibition was not impressive to us. They were, however, using fairly high quality amplifiers and a laboratory model of a loudspeaker which gave excellent and true quality of reproduction. They showed a number of records taken of the Capitol Theatre music, including pipe organ, orchestra and singing. They also showed one talking record made in their own laboratories. The talking record was not good, and when reproduced on a cone such as we use, it was extremely bad.

"Their recording of music reproduced seemingly well, although possibly part of this was due to the high quality of the music recorded, that is, the Capitol Theatre orchestra. After hearing these records we attended a luncheon with Messrs. Adams and Ranger, noted previously, and then returned again to the Bell Telephone Laboratories.

"During this time the latter's apparatus had been given an overhauling, and the showing or reproduction was much better than that heard during the morning. It is interesting to note here that with the Western Electric reproducing amplifier they were using they found it necessary to add an equalizer to correct for a discrepancy in their photoelectric cell. Without the equalizer the low frequencies came through in great predominance. Adding the equalizer decreased the volume to about 1/30 and brought the quality to approximately normal.

"Their photoelectric cell was connected to the first tube using 20 megohm resistances. In our work we use about 2 megohms across the cell and about 50,000 ohms across the first bulb. It is possible that we compensate for the equalization in this manner."

[To be Continued]

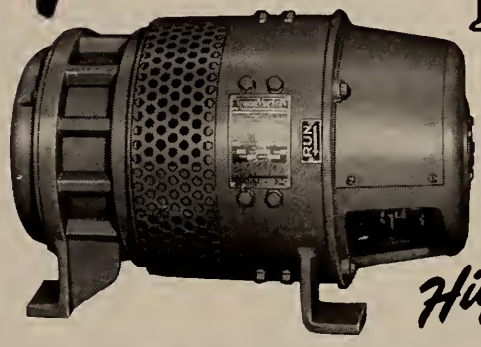
RCA Signs Standard Theatres

RCA Service contracts for 15 houses of the Standard Theatres group, Milwaukee, have been concluded. The agreements provide for regularly scheduled service, emergency coverage and replacement parts for theatres in Milwaukee, Kenosha, Green Bay, Oshkosh, Delavan, and Lake Geneva, all in Wisconsin.

Vast Kodak Filter Output

More than 100 varieties of Wratten filters for standard photographic purposes, and some 20 types of filters for special photographic needs, are produced by Eastman.

Yes—we are gradually catching up on orders for the HERTNER TransVerteR



High Intensity PROJECTION at low operating cost

There's a TransVerteR for every projection room requirement

Transverter Type C.P. (90-100 volt) or M. A. — for high-intensity condenser (straight high intensity).

Transverter Universal Type (45-48 and 90-96 volt)—for Suprex Projectors. Spot Lamps, Dissolvers and all types of projection lamps.

Transverter Type H.I. (42-50 volt) for Suprex Projectors.

Transverter Type H. I. H. (60-70 volt)—for Suprex Projectors and Spot Lamps with 40-50 volt arc.

Transverter Type "LV" (33 volt)—for low-voltage, high-intensity projector (1 K.W. arc).

• In spite of many difficulties, deliveries on Hertner Transverters are running much better than they were at the beginning of the year.

We suggest that you get the facts NOW about Transverter equipment for your projection room.

With Transverter equipment you are sure of:

1. Reliable Performance,
2. Constant Screen Illumination,
3. Quiet Operation,
4. Low Operating Cost, and
5. Long Life.

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Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

VIII.

WE CANNOT pass from the craftsmen's unions of the guild period without some additional reference. For several hundred years the guilds had been composed of journeymen, foremen and masters, all having a profound interest in the guild's welfare, for this was their only protection as skilled workmen. As journeymen they were among the best informed of the citizenry, for more than any others they had traveled widely working at their craft.

They were familiar with many cities, the type of work done there, the attitude of the city officials and the nobles. They probably absorbed worldly wisdom as well as ale in the city's taverns. Everywhere they went they were in contact with the local guilds. They became familiar with their constitutions and by-laws, and also with the provisions of the royal charters which had been secured. The methods of transacting the guild's business in its meetings became known to them.

With this knowledge there had developed a greater pride in their skill and in the traditions and customs of their guild. To have become a craftsman was an achievement. They were in a class separate from all others who worked to live. Much more competent and self-reliant than untrained workmen, they looked upon themselves as superior to farm laborers, the unskilled labor of the cities, and the class of retainers who were attached to the nobles and the wealthy, and who looked to them for protection and living, a poor one at that.

Fraternalism Highly Developed

Attendance at guild meetings made them acquainted with the law of the land, at least as it affected them. They were self-governing, learning something of the simple elements of rules of order.

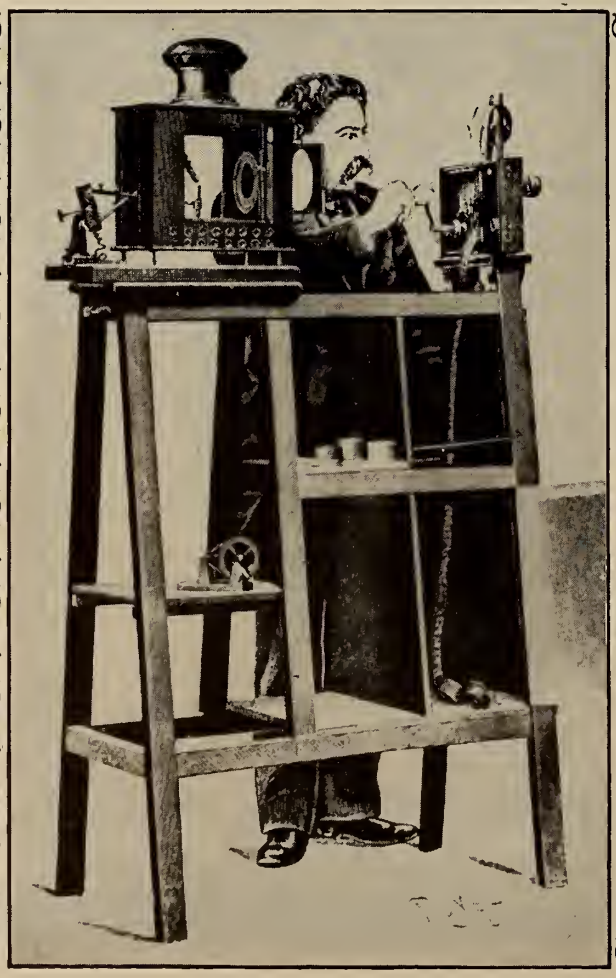
Their conception of the brotherhood of man may have been limited to the brotherhood between all guild members, but they gave this conception most practical application. It was their charge to care for the sick and unfortunate among their own members, the fraternal features of the guilds being highly developed.

As was the practice of the craft unions of ancient Rome, religious observances were a definite and influential part of their life within the guild. They combined three important objectives. The first was the members' craft welfare, the protection of their terms of employment and conditions of labor. Closely connected with this, in fact a part of it, was the active application of the principles of fraternity. Finally, there was the deep religious motive, manifesting itself in much that they did.

Means of Communication

During the period following the Dark Ages, until the time when they yielded to fundamental changes in advancing civilization which they could not control, the craft guilds wrote brilliant and constructive pages in the history covering the period of their existence.

In their day there were no printing presses, no newspapers or other printed matter through which they could keep themselves informed. The minutes of



FLICKER

was the least of his worries

When motion picture pioneers Edison and Lumiere first put images on the screen, they didn't let flicker bother them. Modern audiences, however, demand smooth, easy-on-the-eyes projection . . . the kind that is provided when you use General Electric copper-oxide rectifiers.

You can simplify your projection problems with this reliable d-c power equipment—and get better service in the bargain. Order from your General Electric Distributor, or write to Section A80-945, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

RECTIFIERS

For Motion Picture Projection Service

their meetings were kept in longhand. Information between guilds was largely through word of mouth.

When the journeymen started on their travels they carried neither dues book nor traveling card. They had no way of identifying themselves except by the ritualistic answers given to questions put to them by officers of the guilds they visited, and the silent grips and pass grips exchanged.

In addition to fraternal greetings and assistance from the guilds that the traveling craftsmen visited, they were also, as a matter of right, entitled to so many nights' lodging and so many meals.

There were many with some knowledge of their craft who would have liked to pass themselves off as entitled to greater assistance and standing. In those days, as in more ancient and modern times, for that matter, there were the runaway apprentices endeavoring to pass themselves off as journeymen; there were journeymen claiming to have held foremen positions or to have become master craftsmen.

Each step from the entered apprentice to the master craftsman's status in the guild was accompanied by a knowledge of the passwords of each advancing stage, coupled with the pass grips. All these in combination enabled the master of the guild quickly and definitely to determine the actual status of the traveler who had come to the guild hall.

Members of modern secret fraternal organizations, as they take their several degrees, are taught the signs, passwords, grips and pass grips by which they can make themselves known to other members of the fraternity. Few, very few, realize that what they are taught during their initiation has come down from the medieval guilds—the trade unions of a few hundred years ago—which, having no printing presses or receipt books or membership cards, developed a highly intricate and definite method of identifying themselves.

[To be Continued]

TESMA-TEDPA Trade Exhibit Set

Everything is in readiness for the gigantic joint TESMA-TEDPA trade show to be held at the Shoreham Hotel, Washington, D. C., Sept. 25-28 inclusive. The entire exhibit area, occupying three levels at the Shoreham, has been sold out for weeks. A feature of the meeting will be day-long open forum at which every angle of theatre operation from the roof to the cellar, and including projection, will be discussed, with Alan E. Williford acting as moderator.

Manufacturers and theatre supply dealers, of course, will be in attendance 100%, and advance reservations indicate a strong representation of exhibitors, architects, projectionists and purchasing agents. A special program has been arranged for the ladies.

Order Your Copy of

Projectionists'

$3.00 SERVICE MANUAL

NOW NEW BRENKERTS, DeVRYS, MOTIOGRAPHS ARE FACTORY EQUIPPED WITH "ZIPPERS"

Convincing proof of the equipment manufacturer's changeover preference, is the selection of Strong "*Zipper*" Changeovers as *standard factory equipment* on new "AA" MOTIOGRAPH, new postwar DeVRY, and the new BRENKERT theater projectors. Strong "*Zipper*" Changeovers are available in three models: Strong *Special* (for porthole installation), Strong *Zipper* for sight alone or sound alone, and Strong *Dual-Purpose Zipper* for both *sight and sound.* Essannay Electric Manufacturing Co., 1438 N. Clark, Chicago 10.

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LOOK *inside a* SNAPLITE . . .

See Why it's The Projection Lens of Quality



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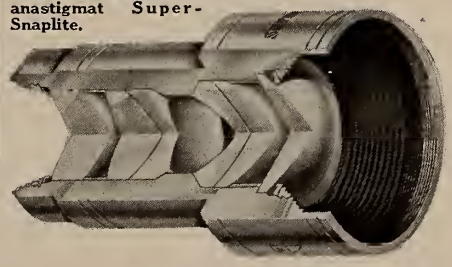
Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

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TROUBLE-FREE performance is assured by the hermetically sealed construction of Snaplite and Super-Snaplite lenses. They never need to be taken apart for cleaning—no dust or oil can enter! And their anodized finishes can't flake off!

For brighter . . . sharper . . . clearer pictures, use f/2.0 Snaplites or f/1.9 Super-Snaplites in your projectors! Full details of all Snaplite lenses are given in Bulletin 204, available from your local supply dealer.

The fastest lens made —the f/1.9 six-element anastigmat Super-Snaplite.





KOLLMORGEN Optical CORPORATION

2 Franklin Avenue, Brooklyn 11, New York

LOW-REFLECTION COATINGS

(*Continued from page 12*)

The usual test given coating by the Armed Services is to rub the coating with standardized erasers, ¼ inch in diameter, for 20 strokes across the same area of the lens at a pressure of 2.5 pounds. This amounts to a pressure of approximately 50 pounds per square inch. If there are no visible effects from this treatment, the element is considered acceptable.

In addition to this test, Army and Navy requirements call for 24-hour immersion in salt water; a 95 F salt atmosphere for 24 hours, and a humidity test at 120 F at 95 per cent relative humidity for 24 hours. The magnesium fluoride can stand these and more severe tests.

I have had many requests for instructions on how to clean coated lenses. It would seem from the Army-Navy specifications that any treatment short of a wire brush would be all right. I would, however, treat a coated lens as I would any other high-quality optical element. I would recommend water or alcohol as a cleaning agent. A clean handkerchief is excellent for drying the lens. If the lens is covered with grit and dirt, try to remove this before real pressure with a handkerchief is applied.

Up until 1943, every effort was exercised toward making coatings more durable in all respects. This development program was carried out so well that in October 1943, at an Army convention on coating, it was decided that there was a need for a method to remove defective coatings. Several companies had accumulated moderately large stocks of lenses which had defective coatings, and if a satisfactory means could be devised, these lenses could be salvaged.

Many people worked on this problem and finally the boric-acid process was developed. This consisted in boiling the lenses in a concentrated solution of boric acid and salt water for 2 hours. The process was not reliable and was very hard on certain types of glass. Dense barium crown glass and some flint glass were strongly attacked by the solution.

The Navy department then devised a much better method, which could be used on all types of glass. This consisted in heating the lenses in a concentrated solution of sulfuric acid and boric acid for about one hour. This process was very successful but required caution and considerable time was lost in decoating.

There are four main advantages in using a low-reflection coating:

(1) Elimination of réflection, (2) increased transmission, (3) greater contrast, (4) better chemical stability.

Elimination of surface reflections is mainly of interest to the photographer. Considerable difficulty is experienced in photographing directly toward a spot of light. A set of ghost images is usually created under these conditions. Coating the camera lens will minimize these ghost images to a point where they are hard to detect.

Tests Reveal High Transmission

To demonstrate the increase in transmission obtained by coating, we coated all surfaces of one of our standard 5-inch anastigmat projection lenses and compared actual light measurements with an uncoated lens of the same design. The increase in transmission over the uncoated-lens system represents 33 per cent. This agrees very well with the theoretical reflection values.

Figure 2 shows a graph giving the percentage reflection in relation to the index of the glass. From this we can determine the amount of light lost, provided we know approximately the index of refraction of this glass used in the projection lens.

The first lens in this particular anastigmat has an index of about 1.62. According to the graph, we would expect 5.6 per cent reflection from the first surface. If we assume that 100 per cent

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MODEL 75-V-6 . . . The result of highly technical knowledge gained from building rectifiers for radar and other intrinsic scientific devices—achieving a new high for rectification efficiency at the lowest possible cost of power. Designed for all theatres using Suprex or Simplified High Intensity Projection. Built-in remote control relays with provisions for operating spotlights. Full 3-phase rectification. No moving parts. Power with flexibility—constant and uniformly smooth current—no flicker. Quiet and ease of operation. Sturdily constructed all-steel case.

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of the light strikes the first surface, the transmission will be 94.4 per cent. The second surface will reduce this 94.4 per cent figure by 5.6 per cent which gives 89.1 per cent.

The second lens in this system has an index of 1.65, which represents a reflection of 6 per cent per surface. If we continue the process of reducing the total transmission received by each surface, by the amount of loss, we arrive at a total transmission of 70.2 per cent.

The low-reflection coatings are not 100 per cent perfect. On a glass that has an index of 1.62, we can reduce the reflection from 5.6 per cent to 0.9 per cent. This represents a gain of 4.7 per cent. On the other type of glass used in this projection lens, the gain is even greater, being 5.2 per cent per surface. Going through the projection lens, using the reflection values for coated glass, we obtained a transmission of 95 per cent. This means that the coated lens will transmit approximately 35 per cent more light than the uncoated lenses.

While the low-reflection coatings have been known for almost 50 years, all the developments which have made it practical have come within the last five years. Coating is really in its infancy, and we can expect many new developments. In the next ten years, coating will probably advance to a point where the index of refraction of the glass does not affect the reflection results. The first attempt at this was made by Dr. Molten, but his coating which accomplishes this is still too soft to be practical.

Although the color effect of coating is primarily caused by a variation of wavelengths of light, this difficulty too may be minimized. The lens designer is now able to use more air-glass surfaces in order to secure better image quality without the fear of poor contrast and low transmission.

Check List of Current and Future Acetate Features

Here is a check list for projectionists anent current and forthcoming Republic releases which utilize the Trucolor process on acetate stock. Republic is the only company currently being supplied with acetate stock.

Current Releases:

That's My Gal
Apache Rose
Bells of San Angelo
Springtime in the Sierras
Along the Oregon Trail
Out California Way
The Last Frontier Uprising
Under Colorado Skies
Home on the Range
Man from Rainbow Valley

Coming Releases:

Gay Ranchero
On the Old Spanish Trail

Ordinary cement will not splice these acetate prints; special all-purpose cement is necessary. Post this check list for reference when playing Republic releases.

New Sales Record for Eastman

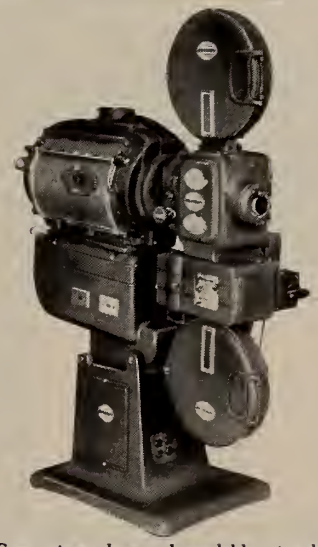
Sales of Eastman Kodak Co. and subsidiaries in the western hemisphere were 29% higher in the first half (24 weeks) of 1947 than in the corresponding period of 1946. Total sales in the period were $153,581,750, which compared with $119,227,385 in the first 24 weeks of 1946.

Net earnings for the period were $20,299,-661, equal after taxes and charges to $1.62 on the outstanding new common stock. For the corresponding period of 1946 the company earned $15,992,956, or $1.27 a common share.

The company's common shares were increased last April from 2,500,000 shares of no par value to 20,000,000 shares of $10 par value. Five new shares were issued for each old share outstanding, a total of 12,441,210 shares issued and 7,558,790 shares unissued. No additional shares were sold.

Demand for film has climbed steadily since the war and the company has used all available production facilities at capacity. All major film products continue to be allocated to customers.

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Motiograph
GIVES YOUR THEATRE THE BEST PROJECTION AND SOUND
The GREAT NEW MOTIOGRAPH "AA" PROJECTOR
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Guarantees long, dependable, trouble-free performance. Now being installed everywbere by discriminating theatres. Decide now to replace your obsolete equipment.
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PRODUCING THE BETTER PROJECTORS FOR OVER 50 YEARS

ACOUSTICS

(*Continued from page* 16)

is approximately the level of orchestral music on the acoustical scale.

Thus, each time the distance between the listener and the loudspeaker is doubled the sound level drops 6 db. These calculations are correct provided there is no physical obstruction or wind tc interfere with the normal carry of the sound beam.

The same definite relationship can be demonstrated where the distance between the listener and the loudspeaker remains the same but the electrical power to the loudspeaker is varied. If in the foregoing example the power were doubled from one watt to two watts, the sound power at 128 feet would be increased by 3 db from 75 db to 78 db.

Distance vs. Electric Power

The same increase in sound power would take place at each distance—at 64 feet the sound level increasing from 81 db to 84 db, at 32 feet from 87 db to 90 db, *etc.* Thus, each time the electrical power to the loudspeaker is doubled, the sound level is increased by 3 db; and, conversely, each time the electrical power is halved, the sound level is decreased by 3 db.

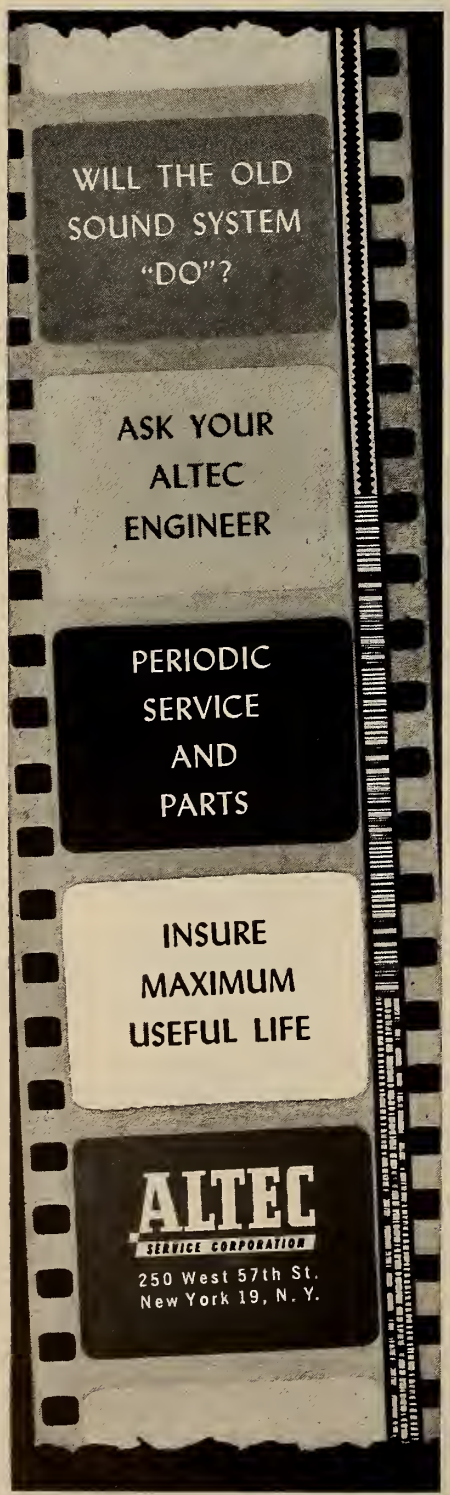
The practical application of these characteristics can easily be seen. Assuming that the acoustical or sound power that various loudspeakers will deliver at stated distances is known, the proper type loudspeaker in relation to the electrical power applied may be selected to meet the specific requirements of each installation. In the same manner the amount of electrical power needed in a given loudspeaker in order to override the noise level of a particular area at a given distance from the loudspeaker may be determined.

Precise Data Required

In the previous example given in Fig. 3, at a distance of 64 feet one watt of electrical power into the loudspeaker will produce a sound level of 81 db. If the noise level in that area is also approximately 81 db, it is obvious that by increasing the electrical power to two watts, the sound power delivered to this area will be increased from 81 db to 84 db, thereby enabling the desired sound to override the noise.

In order to readily evaluate the sound or noise level of a given area or room and thereby provide a base from which equipment may be selected and electrical power determined, the need for an instrument for the practical measurement of sound or noise is indicated. The sound level meter fills this need.

(To Be Continued)



'Magic Mat' Lessens Fatigue in Many U. S. Projection Rooms

"Magic Mat," a new and unique rubber mat for added safety and the elimination of fatigue has recently been introduced by Avenue Mfg. and Sales Co. of Chicago. Consisting of over 2,000 ¼-inch high rubber cones which cushion the feet, this black, non-marking mat is 21¼" square. Its overall thickness is 11/16" with a center layer thickness of 3/16".

Among its many unique features, scientifically designed for use where persons stand on their feet for long periods of time, is its self-cleaning construction, cones on both sides for longer life and elevation from damp floors to prevent electrical ground shocks. It is also non-skid.

"Magic Mat," cost of which is $2.50 postage prepaid anywhere in the U. S., is now in use in many theatres.

Forest Electronic Lamp Ready

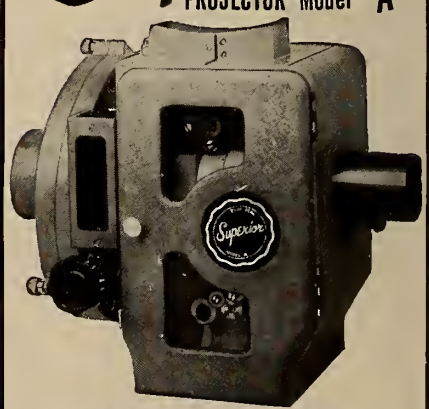
Now available for immediate delivery is the new Forest Electronic Projection Lamp, the first announcement and detailed description of which appeared in I. P. (Sept. and Oct., 1946). This lamp represents a radical departure in carbon-arc lamp design in that it employs an entirely new method of carbon feed the while utilizing individual feed means for both positive and negative carbons.

Electronic timers, rather than a cam-and-gear arrangement, serve to produce actuating impulses for the individual solenoids which control the feeding rate of the carbons.

500 Kodakians Daily Ask 'Why'

Kodak Research Laboratories are the largest laboratories in the world devoted exclusively to research on problems pertaining to photography. More than 500 people are continually searching for additional information on the "why" and the "how" of picture-taking.

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IN THE SPOTLIGHT

(*Continued from page* 21)

fight the fire. Perhaps the worthy police official would like to demonstrate personally just how he would go about fighting a film fire. We think a practical demonstration of this sort would give Inspector Annett something to think about and, perhaps, would make him realize the dangers involved in fighting blazing film. It is so easy to advise the other fellow how to risk his life in an emergency,



St. Louis Local 143 presents gold honorary membership card to Lou Walters (second from left), formerly in charge of RCA's St Louis supply branch and now Southwestern sales representative for Ampro Corp. Shown above are Al Savage, Geo. McDonald and Tony Blust, members of Local 143 who made the presentation to Walters.

but we wonder how these armchair heroes would react if they themselves were trapped in a blazing projection room.

• Phil H. Lipman, secretary of Local 92, Montgomery, Ala., and a State fire marshall, died from injuries suffered in a fall recently while making a routine inspection of a high school building. Phil was well known throughout the Alliance, having represented Local 92 at many I. A. Conventions. He was a popular figure at these gatherings and his unfailing good humor won him many friends. We shall miss him at the next Convention.

• John Shuff, live-wire business agent of Akron Local 364, notified all civic groups meeting in his territory that no films can be shown at their regular meetings unless they employ Local 364 projectionists. Shuff means business and is determined to put a stop to a situation confronting many I. A. Local Unions. It is up to union officials to put a stop to the practice of many organizations who hire inexperienced non-union men to run their pictures; they should insist that I. A. projectionists be engaged for this work.

• Shades of the Civil War! A number of our Southern officials, namely Eddie Miller, Houston, Tex.; John Spearing, Jacksonville, Fla.; Charlie Hathaway, Oklahoma City, Okla.; R. E. Morris, Mobile, Ala.; Al Johnstone, New Orleans, La.; Maynard Baird, Knoxville, Tenn., and Fred Raoul, Atlanta, Ga., left New York on the famous "Yankee Clipper" train to attend the Executive Board meeting in Boston last month.

25 Years Ago—September 1922

• The new I. A. Constituttion and By-Laws ready for distribution to all Local Unions. . . . I. A. representatives Quinn and Sherman assisted the officials of Flint, Mich., Locals 201 (stagehands) and 472 (projectionists) in contract negotiations with the Butterfield Theatres. New contracts called for a 12½% wage boost. . . . Statistical agencies reported an improvement in general business conditions. . . . Number of I. A. representatives increased from 4 to 8. . . . I. A. vice-president Dick Green on a brief vacation from his official duties in an attempt to regain his failing health. . . . Advocates of the "open shop" policy suffered a number of setbacks in the settlement of industrial strikes. Organized labor gave a good account of itself during the trying period and predicted a brighter future for the labor movement.

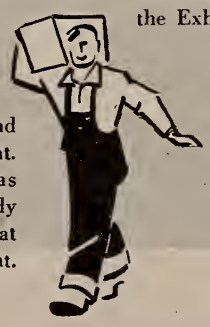
• August out-of-town visitors to the offices of I. P. included Glenn Wallace, Local 337, Utica, N. Y.; Gus Demery, Local 173, Toronto, Canada; A. E. Bradshaw, Local 175, Tacoma, Wash.; Gene Atkinson and Joe Rossberger, Local 110, Chicago; Willie Breitenmoser and Al Johnstone, Local 293, New Orleans, La.; Robert Thomsen, Local 143, St. Louis, Mo.; and in full American Legion regalia Willie (Pop) Stolz, Max (Curly) Kolin, George Fredericks, H. O. Blough, and Harry Brewer of Local 199, Detroit, Mich.

• We learned very recently that Joe Rossberger, member of Chicago Local 110 and a delegate to the last I. A. Convention, served as councilman for the past 12 years in his home town of Wilmette, Ill. This bears out our contention that many I. A. men are civic-minded and take a keen interest not only in local community affairs but in the national political picture as well.

• Mike Keller, member of Boston Local 182, was appointed chairman of the Committee of Proposed Schedule of Percentage Earnings, whose function it is to determine the manner in which the members should pay their dues and assessments, if any. We understand that the Constitution and By-Laws of the Local is being studied with a view to bringing it up to date by adding new amendments, if necessary.



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Altec Lansing New '800' Speaker System

THE smaller theatres with seating capacities up to 1000 seats may now avail themselves of the notable advances in sound repoduction afforded by Altec Lansing's "Voice of the Theatre" loudspeaker system heretofore available only to the larger houses and studio preview rooms. The unit making this possible is the new "800" V. of T. T. speaker system.

This new speaker has demonstrated performance qualities far in excess of even the most rigorous Acaremy standards, with Altec Lansing engineers emphasizing the following six major developments:

Six Major Developments

(1) "Live screen presence," which brings new sensitiveness and "intimacy" to dialogue sequences; (2) higher intelligibility, to relieve auditors' "aural strain" in following complicated and



Altec Lansing '800' Voice of Theatre loudspeaker for auditoriums up to 1000 seats.

fast-moving plot development; (3) a "true" bass reproduction that clearly articulates and makes easily identifiable musical sounds now undistinguishable from one another; (4) greater operating dependability, achieved through new structural principles; (5) response covering the entire range of frequencies now recorded on the sound track; and (6) high acoustic efficiency that prevents distortion caused by overloading the amplifier.

A notable feature of this new speaker is its extreme shallowness of depth, 23 inches, permitting its installation in many small houses where the limited back wall space has always been a major problem.

The l-f horn uses the exclusive V. of T. T. design of direct radiation from the l-f speaker through an exponential horn directly into the auditorium without the loss of frequencies incident to use of the conventional folded l-f horn. This design also eliminates the annoying backstage reverberation so common with conventional systems. The design of the l-f horn for direct radiation from the l-f unit allows full coverage of the frequency range up to 800 cycles.

The h-f horn is a full multi-cellular, 2 x 4 unit each cell being truly exponential. It is designed to operate from 800 to 15,000 cycles.

The network is a full two-section, parallel type, constant-resistance dividing network designed for crossover at 800 cycles. Provision is made for four 1 db attenuation steps in the h-f output so that the system can be adjusted to meet the requirements of any auditorium.

Unit Specs, Performance

The h-f unit is designed to cover the range from 800 to 15,000 cycles. Extremely close manufacturing tolerances are maintained. The h-f diaphragm is made from 0.002 inch aluminum and uses the famous tangential compliance. The voice coil is edge-wound from flat aluminum ribbon wire to reduce weight and to increase efficiency. The magnetic field is supplied from an Alnico 5 permanent magnet.

The l-f horn is a 15-inch unit designed especially to reproduce efficiently from 50 to 800 cycles. It uses the Altec Lansing principle of edge-wound voice coil from flat ribbon wire for greater efficiency and power producing ability. A large Alnico 5 permanent magnet supplies the magnetic field.

Technical specs of importance are: angle of vertical distribution: 40°; angle of horizontal distribution 90°; dividing network crossover: 800 cycles; dividing network impedance: 12 ohms; required amplifier output impedance: 6 to 12 ohms; required amplifier system frequency response (Academy Recommended Frequency Curve); audio power rating: 20 watts; over-all height: 67 inches; over-all width: 50 inches; over-all depth: 23 inches; shipping weight: 296 lbs.

PERSONNEL

ALLEN G. SMITH, or "Smitty" as he is affectionately known throughout the theatre equipment supply field, has been transferred from the post of Circuit Sales Manager of National Theatre Supply Co. to manager of that firm's Chicago branch. He succeeds R. W. Dassow, manager for the past eight years, who resigned to accept a partnership in a theatre sign company.

Smitty's experience in show business dates back to 1910 when he cranked a projector for his father, pioneer theatre owner in Oklahoma and Texas. He was with Southern Theatre Equipment Co. from 1915 to 1926, except for a two-year hitch in the Navy. When National was formed in 1926, Smitty was made manager of the Oklahoma City branch, and subsequently managed the Kansas City office.

In 1929 he was named supervisor of maintenance and purchasing for the Midland and Midwest divisions of Fox West Coast Theatres, and in 1932 he beame assistant general manager of the Dickinson Theatres. He returned to National in 1935.

In 1924 Smitty was named Chief of the Theatre Equipment Section of WPB, and while there authored and administered Order L325, which was widely hailed as a model war agency order because of its simplicity of language and fairness of terms. He rejoined National in 1945.

Smitty is a member of the SMPE and an honorary member of the I.A. and the 25-30 Club of N. Y. City.

* * *

Dr. C. J. Staud has been named director of the Research Laboratory of Eastman Kodak Co., succeeding DR. C. E. K. MEES, founder and director of the unit since 1912, who will continue to serve as Kodak vice-president in charge of research. DR. STAUD joined Kodak in 1924 immediately after obtaining his Ph. D in organic chemistry at Massachusetts Institute of Technology. He has been a research supervisor on cellulose acetate and cellulose derivatives and also head of the emulsion research labs. Since 1943 he has been acting director of the Research Lab.



Dr. Cyril J. Staud, director of Kodak Research Lab.

DR. JOHN A. LEERMAKERS has been named assistant director of the Research Laboratory and head of the photographic theory department.

* * *

JACK O'BRIEN, genial and deservedly popular head of RCA's motion picture equipment section, enlarged his family by one, John Francis, Jr., on July 18. Makes the third offspring for Jack, the other "Russians" being Kathleen, 6, and Jimmy, 1½.

* * *

WATSON JONES has been named Manager of RCA's Hollywood film recording sales effective July 29. JONES, with RCA since 1935 on the Coast, succeeds W. V. WOLFE, who now is associated with the Academy Research Council.

* * *

STEPHEN WIEDEMANN, for the past 4 years manager of South African activities for Western Electric, has returned to New York for home office engineering conferences and reassignment to another office.

* * *

RALPH B. AUSTRIAN, formerly with RCA and lately head of RKO television department, has joined Foote, Cone & Belding, advertising agency, as director of television.



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Every projectionist should know the whys and wherefores of his projection room equipment. He should know what to do and what not to do when his equipment fails to function properly, and how to keep the show going until the service inspector arrives at the theatre. PROJECTIONISTS' SERVICE MANUAL is a complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only $3 per copy, postage prepaid.

Send for it Now! *Do Not Delay*

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19 West 44 Street, New York 18, N. Y.

Gentlemen: Enclosed find $3.00 for a copy of PROJECTIONISTS' SERVICE MANUAL, postage prepaid.

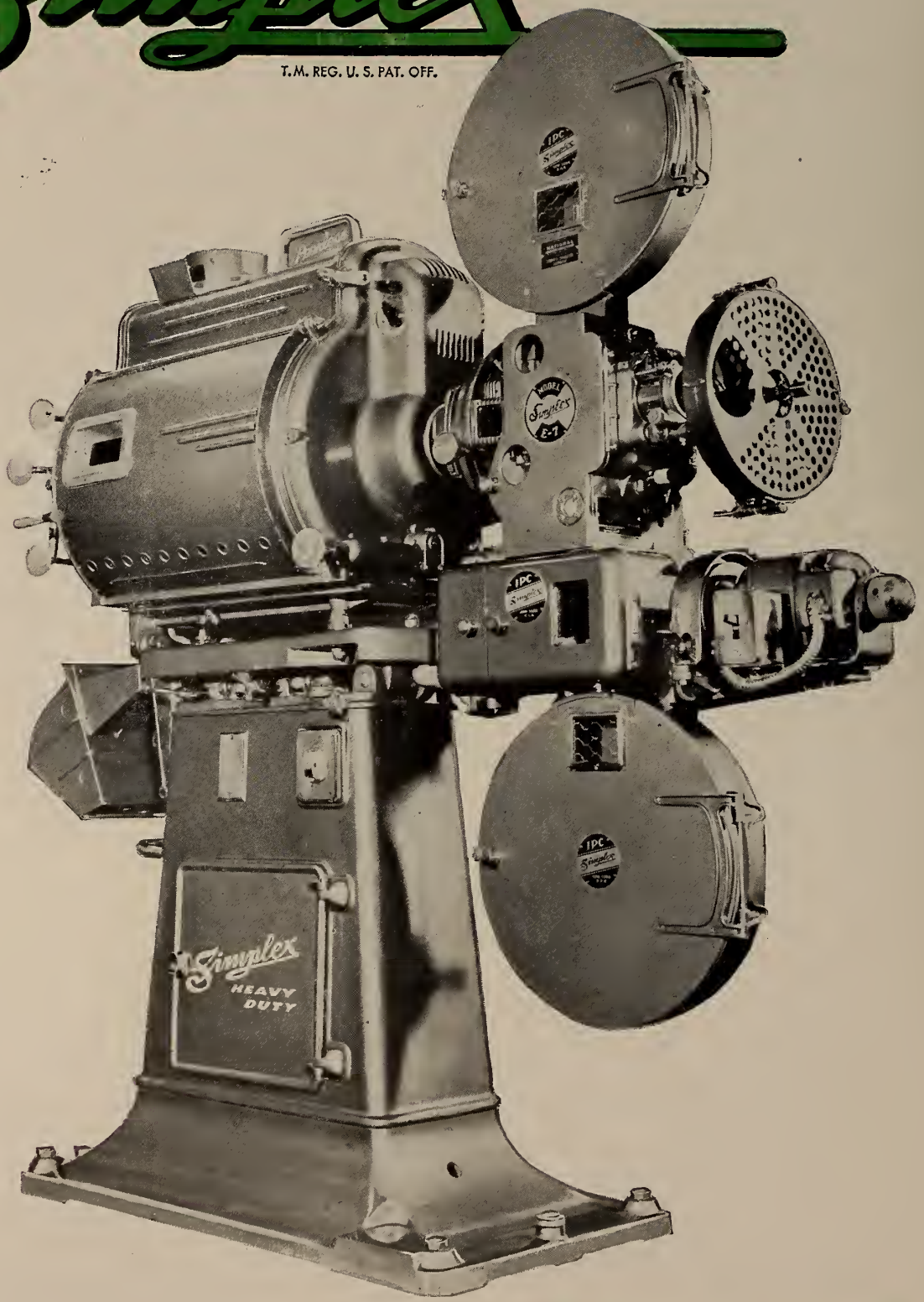
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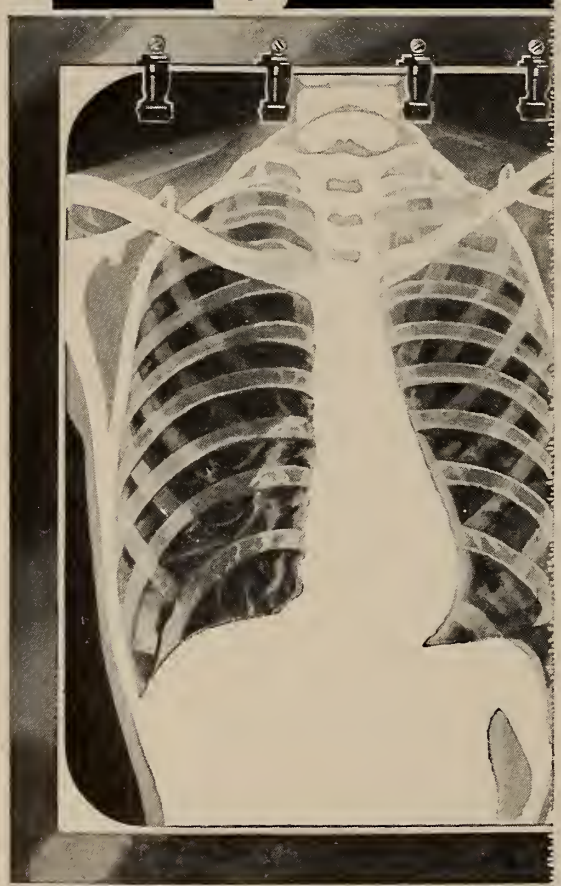
OCTOBER 1947

VOLUME 22 • NUMBER 10

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INTERNATIONAL PROJECTIONIST

OCT 29 1947

INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 22 OCTOBER 1947 *Number* 10

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MONTHLY CHAT

EVEN the most biased observer is forced to acknowledge the giant strides forward registered by television within the past six months. Not only have the video technical forces hurdled obstacles which only a few short months ago appeared to be unsurmountable, but the art has scored impressive advances on the economic front—which means that more and more national advertisers with swollen budgets are displaying an ever-increasing awareness of television's potency as a merchandising medium.

IP has been watching these developments with sharpened interest—and, let it be added quickly, with mounting concern in terms of their ultimate effect upon motion picture theatre box-offices. For, try as we may, and despite the soothing verbal elixirs peddled by our "friends" in the video field, we still regard television as just another and tougher form of opposition to the motion picture theatre as presently constituted.

While recognizing the utter futility of "blowing the whistle" on progress (the Musicians learned this in their fight on sound pictures), we still need not be lulled by the bland words of video adherents into so somnolent a state as to preclude our ever awakening and facing the facts.

All this talk one hears about a "wedding" of the film and video arts is just so much guff. IP has long stressed the utter idiocy of trying to interpolate "spot" tele clips (as they happen) into a regular film theatre program. If there be any delay in screening the event, as the tele people suggest, then it no longer is tele but merely a delayed newsreel.

Knocked down on this approach, the video people talk sonorously about straight tele theatres. But here again we reiterate our conviction that if one may enjoy tele programs in the comfort of one's own home, there certainly is no incentive to so much as stretch a shoelace to go down to the Gem theatre on the corner.

At this point the tele adherents point out that the tele programs presented in the home and those offered in a straight video theatre will be entirely dissimilar. This suggestion requires one hell of a lot of chest-puffing from an industry already sorely beset by the almost superhuman efforts that will be required to rig even a fairly interesting program scheduled to keep a tele station on the air for as little as ten hours a day.

The encyclopedic Dr. A. N. Goldsmith suggests that the inherent gregariousness of we humans will operate to chase us out of our homes to attend one of the theatres, whether movies as we now have them or video shows. This is pretty deep crystal-gazing even for so practical a person as Dr. Goldsmith.

The S.M.P.E. is now and for some time past has been engaged in the strenu-

(*Continued on page* 38)

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"THERE'S A BRANCH NEAR YOU"

INTERNATIONAL PROJECTIONIST

VOLUME XXII OCTOBER 1947 NUMBER 10

W.E.'s New 8-System Theatre Speaker Line

By G. L. GRAVESON

Electrical Research Products Division, Western Electric Company

The first publication anywhere of specific physical and performance data anent the new line of loudspeakers developed expressly for motion picture theatres by the ERPI Division of Western Electric Co. The basic requisites for such speakers were outlined previously in I.P.[1] These new units will be formally introduced at the SMPE Convention, Oct. 20-24.

BUILT not only for today, but also taking into acount possible technical improvements of the future which may well widen the range of sound-on-film recording, the new Western Electric loudspeaker series is designed throughout as a long-standing investment in quality sound. With components developed by Bell Telephone Laboratories, each of the eight horn systems in the line represents a distinct advance in motion picture sound reproduction.

The basic components making up the horns include the W. E. 754A loudspeaker, the 713B high-frequency receiver, and two types of sectoral horns —the KS-12024 and KS-12025—for varying degrees of high-frequency coverage. Indicated in Table A are the makeup and pertinent characteristics of each of the systems.

Used throughout the new W.E. speaker line, the 754-A direct radiator provides high power capacity and efficiency with a minimum of resonant 'boom'.



Apparent in this table is the low weight of each of the systems, resulting principally from improvements in the design of the components. The 754A direct radiator, for example, weighs only 17 pounds.

Crossover Point at 800 Cycles

In designing these systems, extensive listening tests indicated that the use of a high crossover point in the dividing network added to the quality of the systems. In view of the full-range response of the low-frequency unit and horn, it was possible to establish this point at 800 cycles, above the fundamental frequencies of most instruments and voices. As a result, any phase difficulties at crossover do not come in the middle of the fundamental range.

With the 754A providing a nominal frequency response over the range of 60-10,000 cycles, two of the new units—the RA-401 and RA-402—have been designed as direct-radiator, single-unit systems for use in smaller theatres where power requirements are relatively low. This full-range response is the result of such features as introduction of a uniquely shaped diaphragm which makes possible response characteristics not ordinarily available in conventional diaphragm designs.

Damping, or the minimizing of con-

Made of cast aluminum, thus lightening total weight in dual unit speakers, the KS-12,025 sectoral horn provides a coverage angle of 80 degrees.



[1] "What Makes a Good Loudspeaker," by R. S. Lanier; IP for August, 1947, p. 5.

TABLE A.

	Code	Components	Dimensions, with Baffle	Approx. Weight
DIRECT RADIATOR SYSTEMS:	RA-401	One 754A Direct Radiator	48 x 48 x 15	60 lbs.
	RA-402	Two 754A Direct Radiators	48 x 48 x 18	80 "

	Code	Horizontal Coverage	Vertical Coverage	754A L-F Units	713B H-F Units	Dimensions, with Baffle	Approx. Weight
DUAL SPEAKER SYSTEMS:	RA-410	50°	40°	1	1	90 x 99 x 48	450 lbs.
	RA-420	80°	40°	1	1	90 x 99 x 48	450 "
	RA-430	100°	40°	1	2	94 x 99 x 48	465 "
	RA-440	80°	40°	2	1	90 x 99 x 43	465 "
	RA-450	100°	40°	2	2	94 x 99 x 43	480 "
	RA-460	100°	40°	4	2	94 x 126 x 46	700 "

tinuing vibrations within the system, was materially aided by building a substantial amount of damping directly into the 754A itself, appreciably reducing the amount of "boom" which might otherwise build up in the completed system.

The W. E. 713B high-frequency receiver, with an excellent response in the 800-10,000 cycle range, also represents improvements in components of this type.

TABLE B.

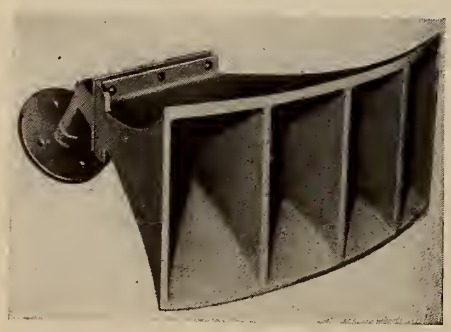
Seats	Output, Watts	W. E. System
750	15	RA-401*
1400	30	RA-402*, -410, -420, -430
2800	60	RA-440, -450
5600	120	RA-460

** Indicates direct radiator systems.*

Here again reduced weight and added ruggedness are combined with a smooth, uniform response.

In this receiver, the wide-range response is made possible by an edgewise-wound aluminum ribbon voice coil together with a small phenolic (plastic) diaphragm. Use of a plastic diaphragm lends added strength and ruggedness to the unit while preserving the response characteristics of earlier metal type diaphragms. High efficiency is accomplished by the use of a powerful permanent magnet of Alnico "5."

The KS-12,024 sectoral horn is used with the 713B h-f receiver. Use of a single throat avoids reflections and interference effects common with double throats.



Two Sectoral Horn Types

Also recent developments of Bell Labs are the two types of sectoral horns which are combined with the 713B receiver in the multiple unit systems to form highly efficient high-frequency loudspeakers. Sectoral horns are used throughout in preference to other types, since they preserve the phase relationship of spherical waves.

Each of these exponential horns is cast from aluminum, their principal differences being in physical dimensions and horizontal coverage angles. In the new W. E. systems, the KS-12024, with its distribution angle of 50 degrees, is used singly or in pairs to provide coverage of 50 or 100 degrees, respectively. The KS-12025 horn is used singly where 80-degree coverage angles are specified. Each of the horns is connected to its individual receiver by a single throat, avoiding the reflections and interference effects often associated with double throats.

These loudspeaker systems have been designed to meet the requirements of theatres of all sizes according to recognized standards, as set forth in Table B.

Selection of the proper system also hinges, of course, on the physical characteristics of the theatre. A theatre of 1325 seats, for example, which is relatively square in shape—would be probably best suited by the RA-430 with its wide coverage angle, while a theatre of the same capacity with a long narrow shape might require the RA-410. The high degree of versatility inherent in the new line assures that one will be well matched to any theatre, despite its size, shape, or acoustic properties.

The entire series of backstage equipment is to be distributed domestically in the theatre field by licensees of W. E., while abroad they will be handled by Westrex Corp.

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

IX.

AND these workmen demand higher wages, "to the dishonor of God, the scandal of the Scriptures and the grief of divers of God's people". This pungent quotation is from documentary records of Massachusetts Bay Colony described by Wesson, the modern historian of the colonial period. It is from a petition presented to the colony's General Court by the more well-to-do colonists. These were the people who had the money with which to purchase better homes and all that went into them, and to provide for their comfort and self-satisfaction. They were resentful of the wages demanded by the carpenters, joiners, boot and shoe makers, tailors and other skilled workmen whose services they required. In the good old English of that day, they were "irked".

They looked to the colony's General Court for relief as the burghers and merchants during the medieval period back in England had looked to the city corporation, or the king, for assistance.

The General Court was impressed by "the grief of divers of God's people" and granted their petition. General orders were issued, as had been done in many other lands during the centuries, sternly forbidding the skilled workers to demand higher wages. Penalties were provided, and were added to from time to time, for "divers of God's people" complained that the craftsmen refused to obey the law. The colonists demanded more severe penalties and a ruthless enforcement.

Every European country since the Dark Ages at one time or another enacted legislation to prohibit voluntary organizations of workmen (trade unions). In each instance the law in the beginning failed of its purpose because of determined and resourceful workmen. Always the law was made more drastic; severer penalties were added and officers

(*Continued on page* 30)



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Projection Data Charts

By ROBERT ALLEN MITCHELL

VI. Optics, Picture Size, Screen Data

LENSES: The E. F. (equivalent focal length) of a projection (objective) lens is usually marked on the lens barrel. This figure cannot always be trusted in the case of second-hand and "bootleg" lenses, however. In all cases where the E. F. imprint is doubted or lacking entirely, a test will have to be made. This can be done by the projectionist by any of the following three methods.

To determine the E. F. of a projection lens:

METHOD 1. Take two large sheets of cardboard and set them up facing each other squarely about four feet apart. In the middle of one cut two or three short slits quite close together with a sharp knife. Place a frosted electric lamp bulb behind the slits. The slits are to be projected upon the surface of the other sheet of cardboard, which serves as a screen.

(A) Measure the exact distance in inches between the two cardboards.

(B) Place the lens to be tested close to the slits, which are illuminated by the bulb behind them. Slowly move the lens away until a sharp enlarged image of the slits is thrown upon the blank cardboard.

Accurately measure the distance in inches of some (any) point on the lens barrel to the cardboard screen. Call this the "enlarged-image distance".

(C) Place the lens close to the cardboard screen, and carefully adjust its position until a sharp reduced image of the slits appears upon the screen.

Accurately measure the distance in inches of the before-used point on the lens barrel to the cardboard screen. Call this the "reduced-image distance".

(D) Then apply the following rule or formula:

RULE: *To find the E. F. of a lens,* subtract the reduced-image distance in inches from the enlarged-image distance in inches, and square the remainder (*i.e.*, simply multiply the number by itself). Subtract this from the square of the distance in inches separating the two cardboards. Divide this difference by 4 times the distance in inches separating the two cardboards. The result will be the E. F. in inches.

FORMULA: D is the distance between the two cardboards; d_1 is the enlarged-image distance; d_2 is the reduced-image distance:

$$F = \frac{D^2 - (d_1 - d_2)^2}{4D}$$

METHOD 2. This method is convenient if the exact focal lengths of the back and front elements of two-element lenses are already known.

RULE: *To find the E. F. of a lens,* multiply the focal length of the back element in inches by the focal length of the front element in inches. Divide the product by the distance in inches separating the two lenses subtracted from the sum of the two focal lengths. The result is the E. F. of the complete lens in inches.

FORMULA: f_1 is the focal length of the back element; f_2 is the focal length of the front element; d is the distance separating the two elements in the lens tube:

$$F = \frac{f_1 f_2}{(f_1 + f_2) - d}$$

(*Note:* Due to the thickness of the elements, which are usually compound in order to correct for chromatic aberration, the foregoing formula is not strictly true. It is, however, sufficiently accurate if the distance between the elements is measured from the fronts or from the backs of the elements.)

METHOD 3. Measure the projection distance (throw) in a straight line from the projector aperture to the center of the screen *in inches.* Measure the width of the picture image across the middle of the screen *in inches.* Then use the following rule or formula:

RULE: *To find the E. F. of a lens,* multiply the throw in inches by 0.825. Divide the product by the picture width in inches plus 0.825.

FORMULA: Δ is the throw in inches; W is the picture width in inches:

$$F = \frac{0.825\ \Delta}{W + 0.825}$$

(*Note:* The foregoing rule and formula obtain only when the standard sound-film aperture, dimensions 0.825 $\times$ 0.600, is used. Where a different type of aperture is employed, substitution of aperture dimensions must be made in the rules and formulae involving the factors throw, picture size, and focal length.)

To determine the "f" *value of a lens:* The *f* value of a lens expresses the relation that exists between the clear diameter (opening or aperture) of a lens and its focal length. It is referred to by photographers as the "speed" of a lens. In form *f* values are fractions with 1 for the numerator, but it is conventional to replace the 1 by the symbol *f*. Thus $f = 1/3$ is written $f/3$ (sometimes f:3 or F/3 or F:3), and it means that the focal length of a lens is three times its clear diameter. Good projection lenses have a speed of $f/2$ or faster. Lenses slower than $f/2.5$ should be investigated to see whether they collect all the light that passes through the projector aperture.

RULE: *To find the* f *value of a lens,* divide its E. F. in inches by its clear diameter in inches. Write this quotient as the denominator of a fraction whose numerator is *f*.

FORMULA: *a* is the clear diameter of the lens; F is its equivalent focal length:

$$f/x = f/\frac{F}{a}$$

THROW AND PICTURE SIZE. *To determine the projection throw:* "Throw", is the distance from the projector aperture to the screen, measured along the optical axis. This distance may be measured directly, though it is seldom done so accurately. Method 1, following, is the most reliable way to measure the throw directly. Methods 2 and 3 are interesting modifications of the direct method. Method 4, an indirect method, is very convenient and gives excellent results when the exact E. F. of the projection lens is known.

METHOD 1. Procure a measuring tape somewhat longer than the throw. With the help of an assistant, stretch the tape tightly from a projection room port to the center of the screen. Add to the distance so measured the distance from the port to the projector aperture. The sum is the throw.

METHOD 2. Measure the *level distance* from the screen to a point directly underneath the projectors. Measure, or estimate, the elevation of the projectors above a level line extended from the *center* of the screen toward the back of the auditorium. Then apply the following rule or formula.

RULE: *To find the throw,* square the level distance from the screen to a point directly below projectors. Square the elevation of the projectors above a level line extended from the center of the screen. Add the two squares. Extract the square root of the sum. The result is the throw.

FORMULA: *d* is the level distance from the screen to a point directly be-

low projectors; h is the elevation of the projectors above a level line extended from the center of the screen:

$$\Delta = \sqrt{d^2 + h^2}$$

(*Note:* To square a number, simply multiply the number by itself. Extraction of square root is more difficult, though actually not much harder than long division. It is customary, however, to use a table giving the roots of numbers. Δ, the symbol for projection throw, is the Greek letter *delta*.

METHOD 3.

RULE: *To find the throw*, multiply the level distance from the screen to a point directly below the projectors by the secant of the apparent projection angle in degrees. The result is the throw.

FORMULA: d is the level distance from the screen to a point directly below projectors; θ_{ap}, is the apparent projection angle:

$$\Delta = d \sec \theta_{ap}.$$

(*Note:* This trigonometric method is much easier to use than method 2, which is algebraic. Since the foregoing equation is dependent on a separately calculated function—in this case a trigonometric function which has already been computed for you—it is an example of a "transcendental equation". Now, the secant of the apparent projection angle may be found at once by simply looking it up in the appended trigonometric table. θ, the symbol for projection angle, is the Greek letter *theta*.)

METHOD 4. This method requires an exact knowledge of the E.F. of the projection lens and the width of the picture image *in inches*. The picture width should be measured with a tape as near to the middle of the screen as possible. Screen masking should be ignored when measuring picture width.

RULE: *To find the throw*, add 0.825 to the picture width in inches. Multiply the sum by the E.F. of the lens in inches. Divide the product by 0.825. The result is the throw in inches.

FORMULA: F is the E.F. of the lens; W is the picture width in inches:

$$\Delta = \frac{F(W + 0.825)}{0.825}$$

The term "apparent projection angle" refers to the angle through which the optical axis of the projectors departs from the horizonal. It expresses, in fact, the "tilt" of the projectors. If the projectors are not tilted at all, the apparent projection angle is 0°. If they are tipped 5° from the horizontal, then the apparent projection angle is 5°.

The term "effective projection angle" is more important as regards results on the screen. It denotes the complement of the angle at which the optical axis of a projector impinges upon the screen. (The *complement* of an angle is the angle subtracted from 90°.) If the screen is perpendicular to the horizontal—that is, if it has no tilt—the apparent and effective projection angles are the same.

To illustrate: If a porjector has a downward tilt of 10° from the horizontal, and the screen is perpendicular to the horizontal, the optical axis strikes the screen at an angle of 80°; hence the apparent projection angle is 10°, and the effective projection angle is 90° — 80° = 10°.

If, however, the screen in the same theatre is tilted toward the projectors by 2°, the angle at which the optical axis strikes the screen is 82°, so in this case the effective projection angle is 90° — 82° = 8°.

It is evident from this discussion that excessive projection angles may be satisfactorily reduced by tilting the screen toward the projectors. The screen tilt should not be much in excess of 5°, however, lest it become noticeable to patrons seated at the sides of the auditorium, and *under no circumstances should a screen be tipped away from the direction of the projectors.*

The maximum effective projection angle permitted by projection engineers is 15°, but in some theatres angles as great as 25°, or even 30°, are encountered. Steep projection angles produce an elongation, or vertical distortion, of the picture

Trigonometric Table for Projection Chart Formulae

ANGLE (in Deg.)	COSINE	SECANT	ANGLE (in Deg.)	COSINE	SECANT
0	1.000	1.000	45	.707	1.414
1	1.000	1.000	46	.695	1.440
2	.999	1.001	47	.682	1.466
3	.999	1.001	48	.669	1.494
4	.998	1.002	49	.656	1.524
5	.996	1.004	50	.643	1.556
6	.995	1.006	51	.629	1.589
7	.993	1.008	52	.616	1.624
8	.990	1.010	53	.602	1.662
9	.988	1.012	54	.588	1.701
10	.985	1.015	55	.574	1.743
11	.982	1.019	56	.559	1.788
12	.978	1.022	57	.545	1.836
13	.974	1.026	58	.530	1.887
14	.970	1.031	59	.515	1.942
15	.966	1.035	60	.500	2.000
16	.961	1.040	61	.485	2.063
17	.956	1.046	62	.469	2.130
18	.951	1.051	63	.454	2.203
19	.946	1.058	64	.438	2.281
20	.940	1.064	65	.423	2.366
21	.934	1.071	66	.407	2.459
22	.927	1.079	67	.391	2.559
23	.921	1.086	68	.375	2.669
24	.914	1.095	69	.358	2.790
25	.906	1.103	70	.342	2.924
26	.899	1.113	71	.326	3.072
27	.891	1.122	72	.309	3.236
28	.883	1.133	73	.292	3.420
29	.875	1.143	74	.276	3.628
30	.866	1.155	75	.259	3.864
31	.857	1.167	76	.242	4.134
32	.848	1.179	77	.225	4.445
33	.839	1.192	78	.208	4.810
34	.829	1.206	79	.191	5.241
35	.819	1.221	80	.174	5.759
36	.809	1.236	81	.156	6.392
37	.799	1.252	82	.139	7.185
38	.788	1.269	83	.122	8.206
39	.777	1.287	84	.105	9.567
40	.766	1.305	85	.087	11.474
41	.755	1.325	86	.070	14.336
42	.743	1.346	87	.052	19.107
43	.731	1.367	88	.035	28.654
44	.719	1.390	89	.017	57.299
45	.707	1.414	90	0	∞

image and, where short-focus lenses are used, the "keystone effect" and difficulties in focussing.

The dimensions of the standard sound-film aperture, 0.825 × 0.600, have been selected in order to produce a picture image whose height is three-quarters its width when the effective projection angle has it maximum allowable value (approximately 15°).

To determine apparent projection angle:

METHOD 1. Measure the angular tilt of the projectors by sighting with a pocket level held against a protractor. Another way is to draw a straight line across a large smooth sheet of wrapping paper. Hold this up against the machine so that the straight line crosses the plane of the optical axis of the machine somewhere along its length. Then make the line true to the horizontal with the help of a level. Next, place points on the paper opposite the optical axis of the machine—a point opposite the lens, another opposite the aperture, and another opposite the arc.

Remove the paper and connect the points with a straight-edge. With a protractor measure the angle at which the two straight lines intersect. Repeat the process several times for each machine to get the most accurate value.

METHOD 2. Measure the *level distance* from the screen to a point directly below the projectors. Measure the projection throw by any of the methods previously given. Then use the following rule or formula:

RULE: *To find the apparent projection angle*, divide the level distance from the screen to a point directly below the projectors by the throw. The result will be the cosine of the apparent projection angle. By consulting the trigonometric table find the angle which most nearly corresponds to this cosine. This angle is the apparent projection angle, itself.

FORMULA: d is the level distance from the screen to a point directly below projectors; Δ is the throw:

$$\theta_{ap.} = \cos^{-1} \frac{d}{\Delta}$$

(*Note:* The mathematical abbreviation $\cos^{-1}$ means the inverse of the cosine, or "anticosine". More specifically, it means the *principal value* of the inverse cosine. The small minus one is not an exponent. Another way of expressing $\cos^{-1}$ is "arc cos".)

To determine the effective projection angle:

Measure the angle of tilt of the screen from the vertical by means of a protractor and level. (A perfectly perpendicular screen will, of course, have a 0° tilt, and in such a case the apparent and effective projection angles are identical. Remember—the screen tilt, if any, is toward the projectors.) Use the following rule or formula.

RULE: *To find the effective projection angle*, subtract the angle of tilt of the screen from the apparent projection angle.

FORMULA: $\theta_{ap.}$ is the apparent projection angle; S is the angle of tilt of the screen from the vertical:

$$\theta = \theta_{ap.} - S$$

To determine the width of the picture:

The "median width" of the picture image is the width across the point where the optical axis intercepts the screen. For all practical purposes this may be taken as the middle of the screen. (Even where the projection angle is quite steep, the point of interception lies only a short distance above the center of the screen.)

Median width is specified on the data sheet because where steep projection angles and short-focus lenses are used, the picture will be slightly under normal width at the top of the screen, and somewhat wider than normal at the bottom.

METHOD 1. Measure the width of the picture image across the middle of the screen directly by means of a tape measure. Screen masking should be ignored when measuring picture width.

METHOD 2.

RULE: *To find the width of the pic-*

FORM VI. OPTICS, PICTURE SIZE, SCREEN DATA

Theatre _____ Date _____
City _____ Revised _____
State _____
Theatre Circuit _____ Chief Projectionist

1. LENSES

Number of projectors _____
Make & Type lenses _____
E. F. of lenses _____
Has normal focus been changed by altering the distance between front and back elements? _____
"f" value of lenses _____
Diameter of barrels _____
Shims or special jackets _____

Special effect lenses:
Make & Type _____
No. _____
Specifications _____

Remarks _____

2. THROW AND PICTURE SIZE

Is projector installation centered relative to auditorium? _____
Projection distance _____
Apparent projection angle _____
Effective projection angle _____

Aperture dimensions:
Type apertures _____
Width _____
Height _____
Square or rounded corners? _____

Picture image dimensions:
Median width _____
Actual height _____
Vertical extenuation _____

Remarks _____

3. SCREEN DATA

Size of screen _____
Size of clear area _____
Make of screen _____
Type surface _____
Perforations _____
Date purchased _____
Date resurfaced _____
Angle of screen tilt _____

Masking:
Material used _____
Details _____
Corners square or rounded? _____

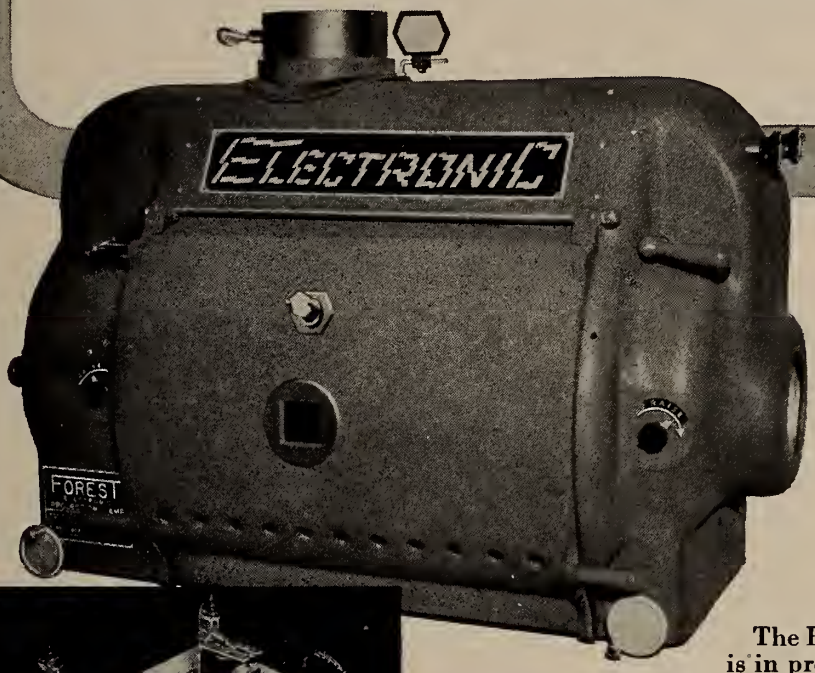
Screen stretcher & support, details

How is screen flown for stage presentations? _____

Auditorium dimensions:
Length _____
Width _____
Balcony height from floor:
First _____
Second _____
Third _____

Remarks _____

The New FOREST Electronic projection lamp



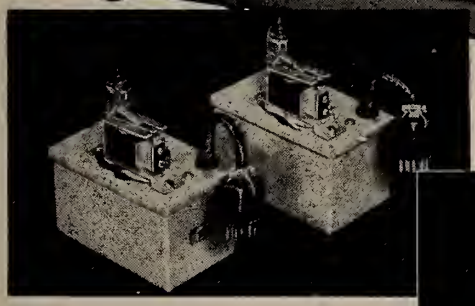
Now Available Quick Delivery

The Forest ELECTRONIC Projection Lamp is in production, available for quick delivery.

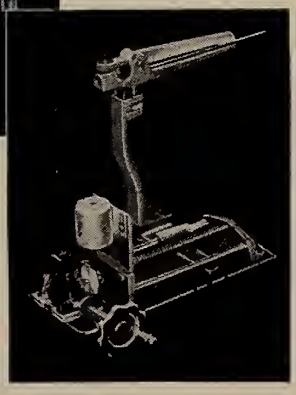
This is the ONLY Electronic Carbon Arc Lamp. It is simple in design, faultless in performance. Carbon feed is controlled electronically. Individual solenoids actuate both positive and negative carbons. A constant gap is maintained, thus making possible maximum brilliance of screen image regardless of the throw.

Unit construction means quick and easy maintenance. Electronic timing of actuating impulses means a steady arc without continual manual adjustment by the operator. Low-cost operation means more profit for the house.

Specify the Forest ELECTRONIC for your next lamp installation.

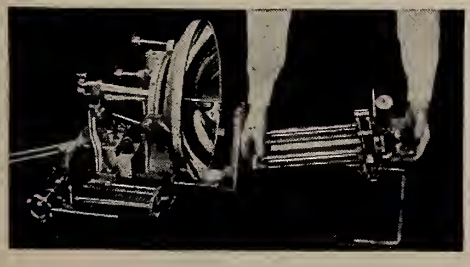


↑ Electronic Timers control production of actuating impulses. These timing units are replaceable in a matter of seconds.



→ Solenoids actuate individual carbon feed mechanisms. Over 300 parts have been eliminated — no fast moving cams, gears or gadgets to wear out.

See Advertisement Page 36 for Data on Rectifiers for Use with the Forest Electronic Projection Lamp.



← Unit construction of entire assembly is demonstrated here. Note simplicity of design and ease of maintenance.

FOREST
ELECTRONIC COMPANY INC.
744 Broad St., Newark, N. J.

ture, subtract the E.F. of the lens from the throw in inches. Multiply the difference by 0.825. Divide the product by the E.F. of the lens. The result is the width of the picture in inches.

FORMULA:

$$W = \frac{0.825(\Delta - F)}{F}$$

Before determining the *actual* height of the picture for those cases where effective projection angles greater than 0° prevail, let us examine the method of finding *normal* picture height; that is, the height the picture would have if the effective projection angle were 0°. It will be noticed that the calculation is analogous to that for picture width.

RULE: *To find the normal height of the picture*, subtract the E.F. of the lens from the throw in inches. Multiply the difference by 0.6. Divide the product by the E.F. of the lens. The result is the normal height of the picture in inches.

FORMULA:

$$H_{norm.} = \frac{0.6(\Delta - F)}{F}$$

To determine the actual height of the picture:

If the effective projection angle is greater than 0°, the actual height of the picture will be greater than the calculated normal height. The vertical extenuation, or lengthening, of the picture increases rapidly as the projection angle is increased, thus while the eye can hardly tell the difference in a picture projected at a 5° angle from one projected "on the level," a difference in the picture as the projection angle is increased from 20° to 25° is easily discernible.

Moreover, the rate of increase of extenuation is influenced by the E.F. of the projection lens, the rate of increase being greater for short-focus lenses than for long-focus ones. Now, the actual picture height may be measured directly, of course, as in Method 1, following, or it may be calculated, as in Method 2. The latter method should commend itself to all projectionists.

METHOD 1. Measure the height of the picture image directly by means of a tape measure. Screen masking should be ignored when measuring picture height.

METHOD 2.

RULE: *To find the actual height of the picture:* (A) Subtract the E.F. of the lens from the throw in inches. Multiply the difference by 0.6. Divide the product by the E.F. of the lens. *Call this "Result 1"*. (B) Divide 0.6 by the square of the E.F. of the lens. Multiply the quotient by the effective projection angle. Add to the product the effective projection angle.

Treat this result as an angular value and, by consulting the trigonometric table, find the secant of this angle. *Call this "Result 2"*. (C) Multiply "Result 1" by "Result 2". This final result is the actual height of the picture in inches.

FORMULA: θ is the effective projection angle:

$$H = \frac{0.6(\Delta - F)}{F} \sec\left[\theta + \left(\theta \frac{0.6}{F^2}\right)\right]$$

To determine "vertical extenuation" of the picture:

The vertical extenuation, or elongation, of the picture due to the factors of projection angle and the lens E.F. may be defined as the factor by which the theoretical "normal" height of the picture must be multiplied in order to give the actual height. The extenuation factor was included as the secant term of the formula for computing actual picture height, namely:

$$\sec\left[\theta + \left(\theta \frac{0.6}{F^2}\right)\right]$$

It will be noticed that this expression is independent of the throw; also that it reduces to 1 for an effective projection angle of 0°.

The remainder of the projection and screen data can be completed without difficulty.

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

IV. FORMATION OF FOX-CASE CORP. A MILESTONE IN THE ART

CASE and Sponable, on Jan. 29, 1926, visited the Warner Theatre (N. Y. City) to see a demonstration of Maxfield's Vitaphone. We all agreed that the showing was very good and of commercial quality. However, we believed that our own reproduction was better with regard to illusion and naturalness. In the W. E. system they were using the large public address system, thus accounting for the large range without distortion. Their loudspeaker was apparently of the horn type placed above the screen.

After lunching with Mr. MacKenzie we returned to Bell Laboratories where we met Dr. Crandall and proceeded to Mr. Craft's office. Craft advised us that his men had only made a preliminary report to him but it seemed that we had nothing in our system which would be of particular use or addition to the W. E. system.

Craft, however, was reluctant to give up our system entirely and said he would like to know more about it. Inasmuch as the reproduction of the film was the real test, we suggested that W. E. send us some of their film, both voice and music. We could then reproduce it at Auburn and at least satisfy ourselves regarding the merits of the two systems. They did not care to submit some of their film already taken, and stated that they would take two numbers and send them up to us the following week.

We then left the W. E. office and proceeded to Captain Ranger's office in the Radio Corp. building. We advised Ranger that we were now ready to go ahead with the talking pictures with them or arrange for licensing the use of their amplifier system. We asked him to bring these things to Mr. Adams' attention and arrange for a get-together to talk the situation over.

Mull Patent Situation

After leaving Ranger we stopped at the office of Mr. Gifford where we talked over the patent situation. He had already prepared an opinion regarding the de Forest and Ries patents, this opinion being that these patents were of questionable value. Our talk with him seemed to further his conviction regarding their questionable value, and he stated that he would send us the written opinion in the near future.

Feb. 13, 1926: Case devised a way to avoid film splice marks by using graded opaque at the join.

Feb. 15 to Mar. 1, 1926: Case and Sponable discussed with Messrs. Whitney and Stone (a vice president of G. E.) the possibility of combining the Case system with the work of their inventor, C. A. Hoxie. G.E. engineers Robinson and Marvin came to Auburn and went over the Case system. They were very pleased with it. Stone, however, would not admit the Case system added materially to that of G. E., and no agreement was reached.

Mar. 19, 1926: John Joy, who knew Sponable at Cornell, paid a friendly visit to the Case laboratory. Technically, he represented Courtland Smith who had just joined Fox Film Corp. Joy reported concerning the Case talking-picture system to Smith, and the latter requested Case to bring his equipment to New York to demonstrate to the Fox people.

Apr. 8, 1926: Max Mayer, a dealer in

(*Continued on page* 33)

† J. Soc. Mot. Pict. Eng., April, 1947, p. 275.



The brilliant arc between two "National" High Intensity projector carbons is brighter — per unit of area — than the heart of a V-2 rocket blast.

This powerful man-made sunlight is harnessed in your projection booth. It is snow white, perfect for bringing out detail and full rich color on your screen. And yet, compared to other operating costs, the expense of "National" projector carbons is negligible.

When "National" projector carbons are used as the light source, you give your patrons the kind of vivid, easy-to-see pictures they really enjoy. You'll find that "National" projector carbons have a definite effect upon your box office.

BRIGHTER THAN A ROCKET BLAST !

For Perfection in Photography and Projection, Use the Carbon Arc

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RCA's Large-Screen Television System

CONSIDERABLE interest has been generated within the industry, notably among projectionists and other technicians, regarding the details of RCA's experimental large-screen television system which has been demonstrated at recent scientific conventions and trade shows. The appended descriptive notes anent this system have been culled from various contributions of RCA engineers to the literature of the art.

The most efficient and effective system for projecting large-screen television images from the face of a cathode-ray tube is one employing the principles of reflective optics. The great light-gathering power of the spherical mirror makes it possible to project a very high percentage of the light appearing on the face of the cathode-ray projection tube.

With the new reflective optical system developed by RCA and incorporated in its advanced experimental large-screen television projector, the quality of screen illumination provided is comparable to that obtained with a conventional F:2 projection lens, while the amount of light reaching the screen is about six or seven times as great.

Ingenious Optical System

The optical system of the projector consists of two elements, a 21-inch spherical mirror and a 14-inch aspherical correcting lens—mounted vertically in a tubular housing. A seven-inch, metal-backed, high-intensity developmental projection tube is placed in such a position that its face is directed toward the magnifying spherical mirror, which is pointed at the projection screen. The large spherical reflector greatly magnifies the picture picked up from the face of the projection tube and projects it through the aspherical lens onto a beaded screen.

The use of a spherical reflective lens with a large aperture introduces difficulties in focusing and results in a certain amount of distortion. For this reason the specially ground weak aspherical correcting lens is used to introduce an amount of distortion which is equal to the opposite of that caused by the mirror.

The effect of the aspherical lens, then, is to balance out the distortion of the reflective lens and the rays of light arriving at the screen produce an undistorted and greatly enlarged version of the original picture, which in this case is 6 by 8 feet, or producing an enlargement of about 16 diameters.

The special projection tube or kinescope employed in the large-screen projector was specially developed by RCA for use in reflective optical systems. Into this projection tube was designed a metal-backed screen such as is used in all RCA projection tubes. In order to obtain light of proper brilliance for projection, extremely high acceleration voltage is required, in this case 50,000 volts.

New types of phosphor compounds were developed, being coated with a fine metallic film, thin enough to allow the passage of electrons. This greatly increased the tube brilliance. In addition to this, a new type of electron gun and other elements were developed to withstand the very high current used by the projector. The result is a tube which produces a brilliant white light nearly as dazzling to the eye as that of an arc lamp.

The developmental tube, the reflective optical system, and the necessary power supplies and control equipment are all self-contained in one unit. While the projector is designed for fixed focus operation, the various operating controls which are mounted on the unit permit the operator to adjust the brightness, focus, and framing of the picture. Only slight adjustment is necessary for an entire program.

Compact, Self-Contained Unit

A new type of power supply has been incorporated into the large-screen projector which eliminates the danger usually present when high voltages are used. A high frequency oscillator power supply used, instead of the conventional 60-cycle type, prevents the storage of high voltage in the filter circuits and thus eliminates the potential hazard to operating personnel.

Television signals can be fed to the large-screen projector from any regular television sources such as network coaxial lines, microwave television relay sources, from studio or camera pickup sources, or any other standard RMA video signal sources.

Tele 'Beyond the Horizon' Found Feasible in Tests

Expansion of tele service to communities beyond the horizon, and even to homes in valleys cut off by mountains from the primary transmitting antenna, has been proven practicable by means of radio relay (as contrasted with a closed wire circuit) states a joint NBC-RCA statement anent tests conducted recently in the Wilkes-Barre, Pa., area through Station WBRE.

Tele signals picked up by a mountain-top antenna from the WNBT transmitter in New York, 105 miles away, were successfully amplified and carried by an RCA microwave relay system to six receivers. This was a pioneer test of repeater-type tele station operation and one of the first in which mircowave relay equipment has been used to carry television "over-the-hump" by beaming it from an elevated receiving antenna down to receivers or a rebroadcast transmitter in an area ringed by mountains.

The first test of the repeater-type operation was conducted successfully recently last week by *The Hartford Times* (Conn.) when NBC telecasts were picked up and amplified at an elvated location near Hartford and relayed by RCA microwave equipment to television receivers in the auditorium.

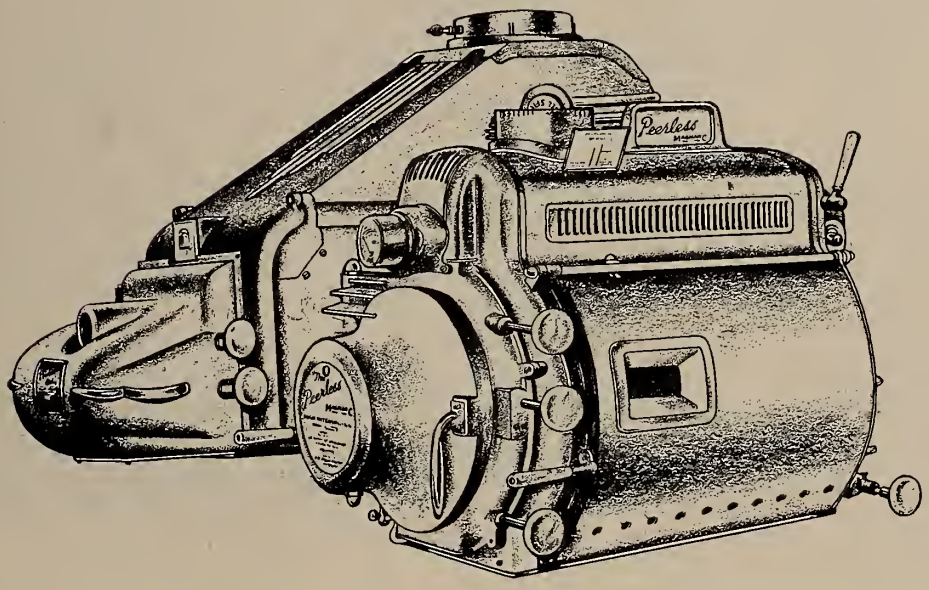
In the Wilkes-Barre test, telecasts from the Empire State Building in New York were picked up by a highly-directional, high-gain antenna installed atop Wyoming Mountain, 2200 feet high, and the signals, relatively weak at this point, were fed through a preamplifier stage to an RCA table model tele set for further amplification and demodulation. ("Demodulation" is the technical term for separation of the video or picture signal from the composite signal broadcast by the station.)

The picture signal is then fed from the receiving set to an RCA microwave relay transmitter at the mountain-top location

(*Continued on page* 37)

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Tele Features SMPE Meet

THE immediate future of theatre television will likely be settled at the forthcoming convention of the S.M.P.A. at the Hotel Pennsylvania, October 20-24. With RCA expending every effort to sell video to a paying audience the while they energetically promote network tele to the home, and with several outstanding theatre projection men scheduled to enter strenuous objections to the intrusion of wired stuff into the normal theatre program, it seems that this meeting of the industry's outstanding technicians will settle the fate of the video art in the theatre for some time to come.

One can only applaud the action of the Society in inviting both brickbats and bouquets anent video art at the several open-forum sessions scheduled for this meeting. IP has long advocated such an open discussion of the conflicting opinions on the proper place of television in the motion picture theatre.

The significance of these discussions to the projectionist is apparent, because this is the first time that the prima donnas of both the video art and the motion picture will be encouraged to express themselves on a development which is fraught with great significance to thousands of workers in the projection art.

Projection Men's Tele Slant

The program reveals the importance with which the hard-driving RCA forces regard this meeting. With three papers programmed, plus a demonstration of large-screen television scheduled, and with the ubiquitous Dr. A. N. Goldsmith summoned to defend their point of view, RCA has finally put itself in the position of either proving or eating its intention to put television over in the theatre field.

It is an open secret that practical projection people who are responsible for the daily operation of hundreds of theatres from coast to coast will strenuously oppose the well-publicized theory that video can be interpolated into the customary movie theatre program. Even so stalwart a proponent of the theory of human gregariousness as Dr. Goldsmith is likely to find the going difficult.

Twenty-five Equipment Exhibits

Television, however, is only one aspect of the well-rounded program of technical papers and exhibits that promise to compensate even the long-distance visitor to this engineering conclave. James F. Frank, Jr., chairman of the arrangements committee, announces that 25 leading equipment manufacturers have already booked exhibition space for what promises to be the provocative display of the latest motion picture equipment.

Film Screen Background Light

A new departure in the use of color for film presentation—the application of dynamic luminous color in screen and auditorium lighting—will be revealed by R. Gillespie Williams. This paper describes a new color mixing lighting controller, soon to be marketed, which provides an almost unlimited range of color hues including all those found in the theatre gelatine range. The new method of decorating with light uses luminous instead of static colors and makes possible the creation of lighting plots to fit in with the film story.

Important Papers Listed

By presenting screen pictures against this background of luminous color, asserts Williams, the size of the "show" area is increased, vision is improved, eye-strain is reduced, and the general effect is the visual equivalent of background music.

Indicative of the wide scope of motion picture technology to be covered at this S.M.P.E. meeting is the appended list of scheduled papers and exhibits:

Report on Advancement of Theatre Design, by Ben Schlanger, architect.

Psychological Aspects of the Theatre, by Walter Cutter, New York University.

General Theatre Construction, by John McNamara, architect. A comparison of low- and high-cost methods of construction under current conditions.

Drive-in Theatres, by S. Herbert Taylor, Consulting Engineer. Selection of suitable property, methods of construction, operation, and maintenance.

Foreign Theatre Construction, by Clement Crystal, Paramount. A resume of foreign theatre construction, methods, and some of their special problems.

Seating Arrangements, Sight Lines, and Seating Design, by Philip Alexa, American Seating Corp. A broad discussion of the entire subject.

A New Theatre Loudspeaker System, by H. F. Hopkins, Bell Telephone Labs. and C. R. Keith, Western Electric Co. The new system employs sectoral high-frequency horns and a crossover fre-

(*Continued on page* 27)



To the Editor of I. P.:

Frequently I come across the expression "Film damaged by the operators," particularly in "warnings" from exhibitors on a prior run which are pasted onto film cans. After years of experience, and in discussions with scores of projectionists in my own territory and elsewhere, I am convinced that the major blame for film mutilation rests with the exchanges.

Three-reel Case Maximum

First, no feature should be shipped with more than three reels in a case. Four-reel cases are too heavy to be handled by anybody, especially when transit of several flights of narrow, winding stairs is required. Very often film cases reach the projection room so battered and crushed that the covers must be opened and, subsequently, replaced with the aid of tools. Once the covers are removed, the film cans themselves require tools for their removal.

The majority of exchanges send out film in such poor condition that it requires a couple hours per feature to *properly* examine and repair it. It's a laugh to encounter "inspection" seals; not infrequently such seals indicate that the film should be sent to the fire department, not projected *via* a carbon arc.

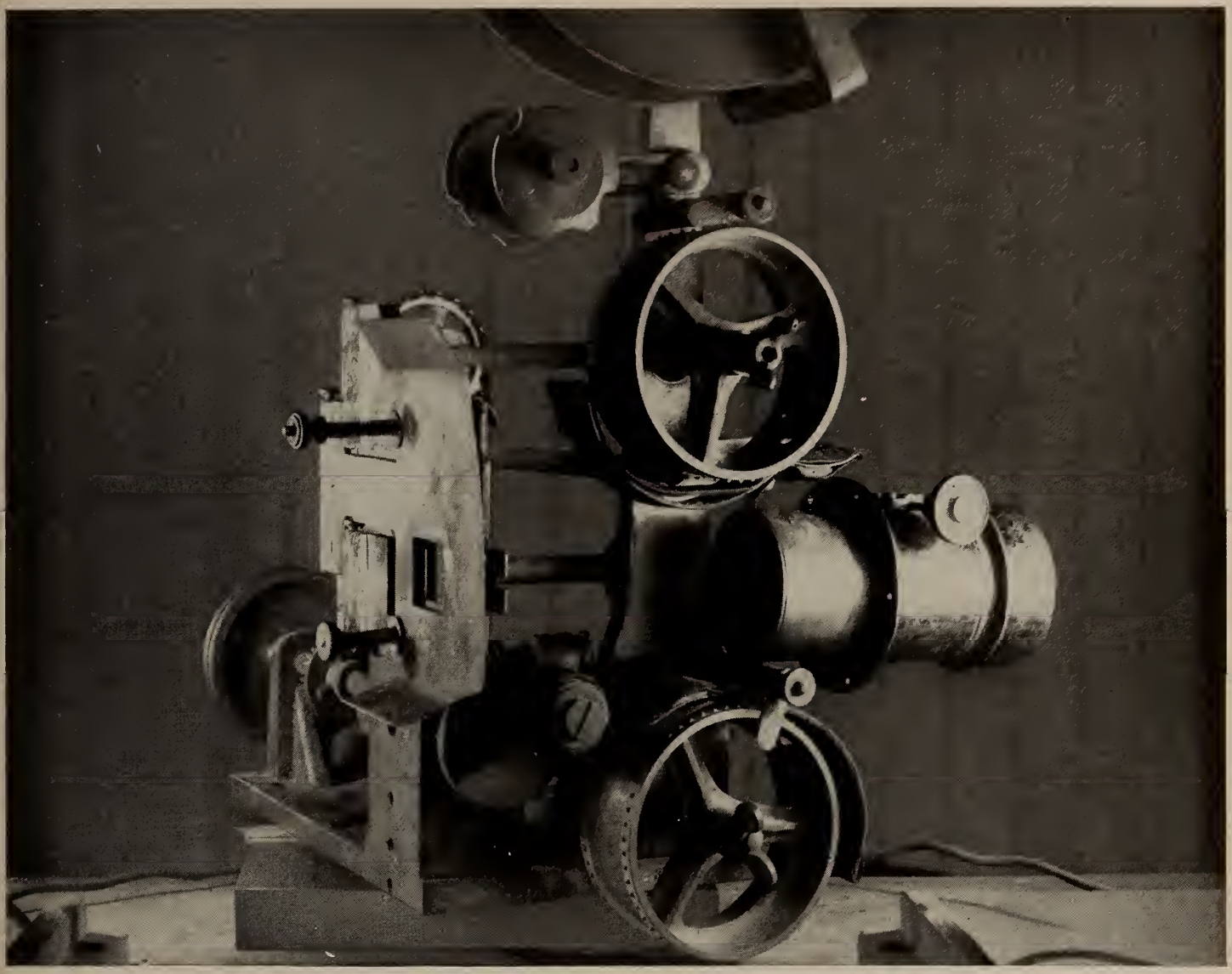
The conditions of leaders is particularly bad. Sometimes a film has very short leaders; at other times there are no leaders at all, which means that we have to run down the film and thus cut the picture. Sprocket holes are broken through and patches open up, attesting to the superficial examination accorded the print.

Hairline Patching Ban Favored

Nine patches out of every ten which open up are curved or are straight hairline patches. Since there exists considerable disagreement as to the comparative worth of acetate and nitrate stock, and as to what cement should be used thereon, it is vitally necessary that these hairline patching machines be banned. Every projectionist I know complains about them. But will the exchanges do anything about them? No; not until we projectionists give them "the works" by refusing to handle such film.

Proper examination of film by the exchanges would enable placing the blame for damaged film where it belongs—instead of damning the craft generally.

(*Continued on page* 35)



The Armat Vitascope which projected the first theater movie, April 23, 1896.



With this, the "unseen showman" got his epoch-making start . . .

THE projectionist has come a long, long way . . . since the 1890's when he put on his show with equipment such as this.

And today, as then, much of a motion picture's success depends upon the unseen showman in his booth.

To his sure sense of split-second timing . . . to his alert control of sound . . . to his deft handling of elaborate equipment . . . the film illusion owes much of its dramatic, realistic presentation on the screen.

Helping the projectionist to keep the mechanics of the medium from intruding is the top quality of Eastman motion picture films (both sight and sound) . . . members of a famous family started more than fifty years ago.

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Modern Photography As I See It

By ERNIE HALLER
Member, I. A. Photographers Local 659

Here a noted cinematographer compares the old with the new in motion picture photography in terms of technique and equipment. Originally appearing in International Photographer, *this article lays special emphasis upon audience reaction to various types of photography. The author has "shot" such important pictures as Gone With the Wind, Deception, Dark Victory, Mildred Pearce, The Unfaithful and more than 200 other features.*

MODERN photography as I see it today is complete realism. What the camera unfolds on the screen should be a piece of real life. Too many people have the idea that good photography is beautiful photography. This is not true, because photography should never be allowed to become so effective that undue attention is directed to it.

We can draw a very good parallel by looking at any magazine advertisement. The primary purpose of an advertisement is to sell merchandise. But if the art work and photography are so beautiful and startling that it draws attention from the article it is selling, the advertisement has failed.

The same is true, of course, with modern screen photography. If the camera work in a picture is so beautiful that the audience stops to admire it, we have sacrificed the camera's primary purpose —to tell a continuous story. Tricky photography with all its complicated shots diverts the audience's attention. If we allow this to happen, we are not good cameramen or photographers. For this reason, I say the best photography is photography of which one is not conscious.

'Hard and Harsh' Period

In its infancy, photography was far from beautiful. It was hard and harsh. There were many reasons for this. Most shots were made outside, or if they were made indoors, the scenes were blasted with light. Also, the film and the camera lens at that time were not sensitive.

As modern science brought us better studios, better lighting equipment and better cameras, the opposite extreme was the next step. The cameraman intentionally made all of his shots too beautiful in an effort to get away from the harshness of early-day photography.

But this could not last long. Everything became blurry, fuzzy and out of focus. Photography was too soft and too beautiful. Today, modern photography is a compromise between these two extremes, and this came about through the laboratory more than through the cameraman himself. The labs developed a finer grain film and brought out a method of softer development. Most of this started when the Leica cameras were put on the market. The small contact prints which were blown-up for enlargements needed better development to get away from the granulated effect.

Wed Composition to Story

In early-day photography the composition of a shot was made for composition's sake alone. Modern photography has completely wedded composition and story-line, whether the picture to be is a simple Brownie candid photograph or a full-length motion picture. Today, composition is built around the proper point of interest. It is used to complement the emotional qualities of the scene to be made.

For example, if we are working with a scene that shows violence, or if we are working to build suspense to a climactic scene, agitation can be started in the audience by off-center composition. For scenes that demand calmness, composition is handled with an eye to even qualities. In other words, different balances are used today for different types of emotional scenes.

Composition is the modern photographer's biggest job. Anyone can learn the rudiments of photography, but it takes someone with a "feel" for it to become an outstanding photographer. If I were giving advice to the beginner in photography, I would suggest a three-year art course to learn balanced composition.

In filming a scene, a cameraman thinks first of his story. He must live it as much as any of the players do. He must feel the emotions, he must cry with them and laugh with them, for it is his job to

(*Continued on page* 36)

B. & L.'s New 40-Inch Photographic Lens 'Stops 'Em'

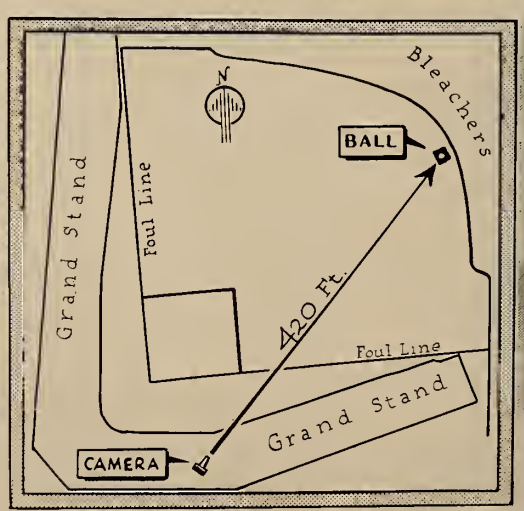
BIG BERTHA is an exceptionally clever gal who always gets her man no matter how fast or how far he may travel. Such is the opinion of photographers, particularly in the sports field, who are now using the new super-distance camera the optical heart of which is a coated 40-inch Bausch & Lomb lens capable of "stopping" even the fastest action.

Developed early in the war by the B. & L. Scientific Bureau, the camera's powerful, color-corrected lens is the same type that was used on hundreds of high-altitude photographic missions and for recording the atomic tests at Bikini.

The lens alone weighs 32 pounds and is 34 inches long. Despite this giant size, it has remarkable speed and depth of focus. Ordinary sport-shot lenses have an average speed of about F:8, but Big Bertha rates at F:5.6, which gives considerably wider latitude in camera operation.

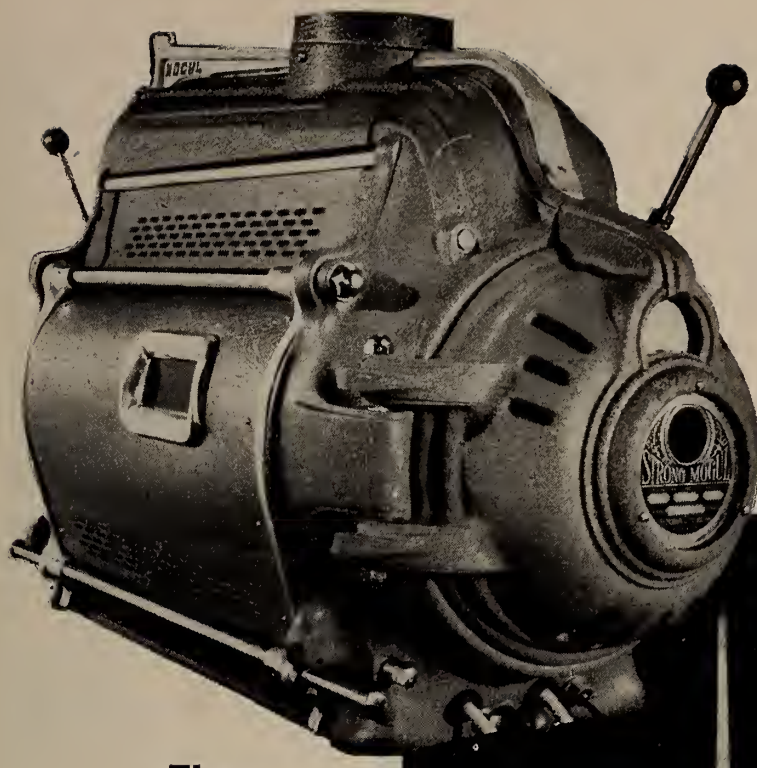
Made up of five separate lens elements, Bertha's "eye" measures about 12 inches in length, nearly 8 inches in diameter, and covers a 5 x 7-inch film. The camera weighs 57 pounds overall, but the ease and facility with which it is handled is shown in the accompanying illustration.

Diagram at left shows enormous distance traversed with fine detail by new long-range camera. At right is closeup of 40-inch (1016 mm) lens, compared with midget 9.6 mm B & L. projection lens.





GOOD NEWS for DRIVE-INS and LARGE THEATRES





The 1947 MODEL STRONG MOGUL PROJECTION ARC LAMP

Projects 15,000 lumens of light—the maximum film will accept without damage—at the lowest possible cost.

Utilizing all the advantages of 70 ampere, 40 volt burning of Suprex carbons, this Mogul projects a brilliant picture on 48-foot and larger screens with all details clearly visible 500 feet or more back from the screen.

It is impractical to use more than 15,000 lumens as it would damage the film and no advantage is gained by the use of contraptions for cooling the gate, or glass heat filters, for they absorb practically as much light as they do heat, in addition to being too expensive and complicated for typical theatre applications.

It is furthermore wasteful, as well as futile, to burn more than 70 amperes in any reflector lamp, or twice the current in condenser lamps.

REGARDLESS OF THE SIZE OF YOUR SCREEN YOU CAN HAVE REALLY BRILLIANT PICTURES

THE STRONG ELECTRIC CORP.

The World's Largest Manufacturer of Projection Arc Lamps

NOW, MORE THAN EVER, WHEN THE LAMPS ARE *Strong* THE PICTURE IS BRIGHT

USE THIS COUPON FOR A FREE DEMONSTRATION OR LITERATURE

THE STRONG ELECTRIC CORP.
87 City Park Ave., Toledo 2, Ohio

( ) I would like to have a demonstration of the 1947 Model Mogul Projection Arc Lamp in my theatre, without cost or obligation.

( ) Please send free literature on the 1947 Model Mogul Projection Arc Lamp.

NAME .....

THEATRE .....

STREET .....

CITY AND STATE .....

IN THE SPOTLIGHT



By *HARRY SHERMAN*

THE applicability of the Taft-Hartley law to motion picture projectionists seems headed for an early judicial determination as a result of the suit filed recently by the Fontana (Calif.) Theatre against IA Local 577 (San Bernardino). The dispute centers around the hiring by the theatre of a part-time, non-union projectionist, which prompted Local 577 to picket the house. Penalty of $100 a day damage, as provided by the T-H law, is asked of the Local.

The IA stand on this question was set forth by President Richard Walsh in a letter sent out to all Local Unions on September 15 last. Said Walsh, in part:

"No decisions have yet been rendered under the new law to define its meaning in various aspects and to clarify the scope of its applicability. In the absence of any such decision, it is the position of the Alliance that Local Unions in the exhibition field are not covered by the Taft-Hartley law, and unless and until there is an appropriate determination to the contrary, the Alliance intends to continue to maintain that policy."

The IA position, which extends even to those men working for circuits which may have houses throughout several states, has been buttressed by various Washington and local rulings to the same effect.

While the IA has thus far shown no disposition to seek a showdown on the T-H law, it is felt that the Fontana case is welcome as a means for effecting final determination of the question.

• According to a survey of 185 companies, released by the National Industrial Conference Board, extra vacation allowances for long-service employes and more paid holidays for wage-earners are two significant developments in vacation and holiday practices. The study showed that 51% of the reporting companies pay wage-earners for holidays not worked, with most of the companies granting from 6 to 12 paid holidays per year. Very interesting facts and worth while remembering.

• The injured knee of Jim Biggerstaff, business agent of Local 290, Winnipeg, Canada, is not deterring him from pursuing his usual activities. Jim is one of our more capable Local Union officials and knee injury or no, he still is a thorn in the sides of exhibitors who find him a pretty smart customer to deal with.

• It takes more than a couple of torn ankle ligaments to keep a good man down. Ralph Root, business agent of Local 236, Birmingham, Ala., must have been star-gazing when he stepped into

CLEVELAND LOCAL 160 STAGES SURPRISE PARTY IN HONOR OF SECRETARY VICTOR WELMAN AND HIS BRIDE

Practically the entire membership of Local 160 and many prominent civic and labor leaders in Cleveland turned out to honor Vic Welman and his bride, the former Elsie Berg, at a surprise party given by the Local. Standing at the speakers' table, left to right, are: Mr. Schwartz and Mr. Kalafat, president and labor representative, respectively, of the Exhibitors Association; Michael Sawdo, L. 160 vice-president; Art Hopcraft, master of ceremonies; Wm. P. Raoul, I. A. general secretary-treasurer; Harland Holmden, business agent, L. 160; Clarence W. Grugle, secretary of L. 27; Mrs. and Mr. Victor A. Welman; Jack Fitzgerald, president, L. 27 and I. A. representative; Wm. Finegan, business agent, L. 27 and secretary Cleveland Federation of Labor; and Jack Burns, president, Cleveland Federation of Labor.



a hole in the street and hurt his ankle. However, all's well that ends well and Ralph is back on the job none the worse for his mishap. Incidentally, he was re-elected secretary-treasurer of the "Big Six" of the South, which comprises the projectionist Local Unions in Knoxville, Nashville, Chattanooga, and Memphis, Tenn.; Birmingham, Ala., and Atlanta, Ga.

• Trail-blazing seems to be an outstanding characteristic of Gene Atkinson enterprising business manager for Chicago Local 110. Upon the enactment of Illinois State Senate Bill No. 435, which classifies motion picture operators as "projectionists" instead of laborers, Gene placed a Local 110 man at the Chicago State Hospital for the showing of 16-mm motion pictures, at a monthly salary of $500 for a 40-hour week. In addition, the projectionist is entitled to all civil service privileges, including a two-week vacation with pay, and sick leave of one day per month.



Eugene Atkinson

Carrying out his policy of obtaining road scale wages for Local 110 men who run feature pictures at increased prices, Gene placed two men on each shift, at $3.84 per hour, per man, wherever the picture "Duel in the Sun" was shown. This picture was shown all over the country at top prices, with neighborhood theatres upping their admission prices as much as 100%, without extra compensation to the projectionists.

• In recent negotiations with Los Angeles Local 150 officials, the exhibitors demanded the insertion of four clauses in the new contracts which, if accepted by the union, would practically be the same as turning the Local Union charter over to the theatre owners. Needless to say, the proposal was flatly rejected by Local 150 and not until a satisfactory settlement is made will the union sign any contracts. Negotiations for the Local are in charge of George Schaffer, business agent, and I. A. vice-president Carl Cooper, who may be depended upon to look after the best interests of the men.

• Bill Hartnett, business agent for Local 257, Ottawa, Canada, and Nick Smith, also of Ottawa, were recent callers at the IP offices. Bill brought along with him a photograph taken of the delegates to the Canadian 11th District Convention which was held in Kingston, Canada, October 1922. Many of those appearing on the photograph have either passed on or are no longer active in IA affairs. A reproduction of the group picture will appear in the next issue of IP.

• Hollywood Local 165 will hold its second annual dinner dance Saturday, November 8, at the Santa Monica Ambassador Hotel. It promises to be a gala affair with plenty of good food, music and entertainmnt provided for the pleasure of the guests.

• IA President Walsh is one of the only three Americans privileged to address the British Trade Union (the equivalent of our AFL Executive Council). The other two Americans were Wendell Willkie and Ambassador Winant.

• Supplementing an item that appeared in this department in the July 1947 issue, page 17, anent the poor condition of film sent out by the exchanges, we refer our readers to the Max Winston comment in our "Letters to the Editor" department for this issue.

• Victor A. Welman, secretary of Cleveland Local 160, was invested with the highest Masonic order—the 33rd degree—at the Supreme Council's annual meeting in Cincinnati last month. As we said once before, it couldn't happen to a nicer guy.

We had occasion to read a list of Victor's Masonic accomplishments and we were amazed at the number of high honors conferred upon him, as follows:

Past Master of Meridian Lodge No. 610 F & A.M. (Treasurer of Meridian from 1931-1944, Secretary of Meridian from 1944-1947); Past President Past Masters Ass'n of the 22nd Dis. of Ohio; Past High Priest Webb Chapter No. 14, R.A.M.; Past President Past High Priests Ass'n 16th Dis.; Grand Chapter Inspector for five years; Grand Representative to Grand Chapter of Indiana; Past Master of Cleveland Council No. 36, R & S.M.; Grand Representative to Grand Council of Ontario; Past Commander of Oriental Commandery No. 12 K.T.; Prelate of Past Commanders Ass'n of the 7th Division; Past President of Knight Templar Council (Officers Ass'n) of the 7th Division; Secretary of Knight Templar Council; Member of Al Koran Shrine (Lake Erie Consistory, Knights of the York Cross of Honor, Lincoln Chapter O.E.S., Al Sirat Grotto, Cleveland Lodge of Elks No. 18).

Whew, it almost took our breath away!

• Another member of our craft has fallen a victim of that dread malady, heart trouble. Charlie Sturgess, member of Toronto Local 173 and of the Famous Players 25 Year Club, died in the projection room of Loew's Theatre in Toronto while making a changeover.

• Every once in a while we receive a rude awakening and are reminded of the fact that time and tide wait for no man. Such was the case when we learned of the marriage of Rita, daughter of Roy R. Ruben, financial secretary of Detroit Local 199. We have known Rita since she made her first appearance in this cock-eyed world of ours. It won't be long when Roy will become eligible for membership in the ever-increasing class of I. A. grandpops.

25 Years Ago—October 1922

• Representative Fred Raoul had a busy time in Oklahoma, Texas and Georgia adjusting wage scale difficulties. . . . IA President Charlie Shay, General Secretary-Treasurer Lemaster, Representatives Bill Dillon, Lou Krouse, and Harry Sherman, represented the IA General Office at the 11th District (Canada) Convention held in Kingston, Canada. (Incidentally, a photograph of the delegates taken at this convention will appear in the next issue of IP). . . . Vice-Presidents Bill Canavan and Dick Green on

(*Continued on page* 24)

DETROIT LOCAL 199 MEMBERS ELECTED OFFICERS OF AMERICAN LEGION POST.

Seated in front: Gilbert L. Lubin, Seniar Vice-Cammander; Owen Blaugh, new Commander; Rabert Goldstaff, Juniar Vice-Commander. Standing, left to right: Welber Haartge, Adjutant; George Turner, Finance Officer; Irving Reif, Detroit District Commander; Harry L. Carson, Past Commander; Arthur Clark, Dept. of Michigan Cammander; Wayne Roberts, Past Chaplain, and F. W. Light, Sergeant-at-Arms.



ACOUSTICS

II. Sound Level Meter—Noise and Noise Levels—Sound Frequencies—P. A. Requisites—Reverberation Data

*Copyrighted by Sound Products Section, RCA**

THE sound level meter is a device for measuring the intensity of sound calibrated in db. It is a small, compact instrument, weighing approximately 24 pounds and measuring 9½ x 13½ x 12 inches. It accepts sounds from all directions, measuring sound received on a direct line from the source as well as any reflected sound, thereby giving an over-all measurement of all sound at a particular point. The total sound is registered upon the meter in db. automatically giving the sound or noise level of that area.

The sound level meter finds many practical applications. In determining studio location, for example, some quick and effectual samplings of the noise levels at various points within a structure can be made to determine the point of lowest noise level. Furthermore, the sound level meter also measures any outside sounds or noises which reach it. Thus, the effect of nearby railways, adjacent factories, street noises, *etc.*, upon a given location are readily discernible.

In establishing the location of loudspeakers in a noisy area the sound level meter is invaluable in determining the amount of audio power necessary to override the sounds normally present in this room or area. After the normal sound or noise level of a particular area has been determined, a loudspeaker operating from sufficient electrical power and possessing the proper directional characteristics may be selected.

Noise and Noise Levels

Also, after the point of highest sound intensity has been found within an area, the location and facing of the loudspeakers in relation to the source of this predominant sound may be better determined.

Previously the term "noise level" was interchanged with the term "sound level." This is understandable when it is realized that noise or sounds unpleasant to the ear possess levels of intensity or loudness just as musical notes or pleasant sounds possess levels of intensity or loudness. Noise level merely refers to the intensity of noise in terms of db.

Noise is defined as any unwanted or undesired sound. It is usually irregular and non-musical in character and of a disagreeable, irritating quality. While noise is usually made up of a wide range of frequencies, one or two particular frequencies may predominate. The presence of predominant frequencies in noise is cited because of the problem which is sometimes created by this condition.

Should these predominant noise frequencies be the same as frequencies reproduced by the loudspeakers, the sound level will build up and intensify these noise frequencies. The end result is an apparent intensification of the noise frequencies with no appreciable increase in the clarity or loudness of the desired sound.

In order to overcome noise normally present in a room or area the loudspeakers must provide sufficient sound power to override the noise. For the reproduction of speech in the average quiet location a sound level between 60 db and 70 db is needed to provide comfortable listening. If the program seriously exceeds this level, it is uncomfortably loud for the listener; if it falls below this average level, it cannot be properly heard. On the other hand, in a noisy location where an average noise level of 70 db or more may already exist, the sound power from the loudspeakers must be increased by an equivalent number of db to overcome the noise already present.

Music Requires Higher Level

For the reproduction of music in the average quiet location a slightly higher sound level is required than is needed for speech. The different parts of a musical program differ in loudness and vary over a broader range. A sound level from 80 db to 100 db is usually adequate, but if a high noise level is encountered, this range must be increased to make the program heard above the noise. If a sound system must reproduce both speech and music, meeting the power requirements for music obviously assures ample power for speech.

Under most circumstances a high noise level may be overcome by (1) sufficient power, (2) the right loudspeakers and (3) proper location and facing of loudspeakers. If the noise level of a room is especially high and objectionable, however, the value of the acoustical treatment to reduce the overall noise level should not be overlooked. The noise quieting accomplished by these means will often create a quieter, more desirable listening area and at the same time permit better sound system performance.

Sound Frequency Range

In the installation of any sound equipment the range of sound frequencies that the equipment is required to handle is always an important factor. Sound frequency is defined as the number of cycles completed per second (abbreviated c. p. s.).

Again referring to the example on loudspeakers, each complete trip of the diaphragm—starting from its neutral position, moving to one side, and finally back to neutral again—is termed a "cycle." The rapidity with which these cycles occur per second determines a sound's frequency or its pitch. High-frequency sounds are high-pitch sounds, such as the treble notes on a piano or the shrill tone of a whistle. Low-frequency sounds are low-pitch sounds, such as the bass notes on a piano or bass drum.

The human ear is sensitive to a frequency range from approximately 16 to 20,000 cycles per second. Although expense and size precludes the design of microphones, amplifiers and loudspeakers which can reproduce this entire range of frequencies, sound equipment, whether it be for speech only, music only, or a combination of both, must be designed to transmit uniformly most of this range of frequencies with as little distortion as possible.

Microphones used for paging, announcing, or speech only should be designed for this particular application. A slightly wider range and flatter frequency response is needed for choral and orchestral work. More frequently a microphone is used for both music and speech, necessitating the use of an

* A chapter in the recently published "The Architects Manual of Engineered Sound Systems," reviewed in IP for Sept., 1947, p. 28.

instrument with the higher frequency response. The same requirement applies to amplifiers because they also handle all types of reprodution, making a wide frequency range desirable.

P.A. Work Requirements

For conversational speech and public address work experience has shown that loudspeakers must be able to transmit frequencies within a range of approximately 200 to 4500 c. p. s. to insure intelligibility and clarity. Although frequencies above and below this range are not generally needed for intelligibility in speech work, frequencies below 200 cycles do help to preserve balance and naturalness of tone and may be included to advantage in the loudspeaker range.

For orchestral or vocal groups a loudspeaker which can transmit frequencies within a range of 75 to 7000 c. p. s. is needed. This range is only average, however, and applies to the loudspeaker which uses only one loudspeaker unit or voice coil. A more elaborate loudspeaker, such as the RCA Twin Power unit, employs two loudspeaker units or voice coils—one for low- and the other for high frequencies. It has a frequency response ranging from 50 to 11,000 c. p. s., and as a result offers fuller and truer reproduction.

In the final analysis the range of frequencies reproduced for the listening audience depends upon the quality and adequacy of the entire chain of sound equipment. To substitute an inferior unit anywhere in the chain merely reduces the effectiveness of the others, thereby impairing the listening results of the entire system.

Reverberation Data

When sound is generated within an area the listener receives a first impulse of this sound directly from its source, but he also hears successive impulses reflected from the walls, ceiling and other surfaces. This means that the total sound reaching the ear is a combination of both direct and reflected sound.

This continuation or persistence of sound within a room after the source has ceased to emit sound is defined as "reverberation." The time necessary for this residual sound to die away to one-millionth of its original value, or 0 level db, is called the "reverberation time." When of a satisfactory value the reverberant sound reenforces the direct sound, thereby enhancing it and improving the spatial effects as well as increasing the loudness. This is a desirable condition under which to operate sound reproducing and reenforcing equipment.

On the other hand, if the tones of a speaker, vocal group or orchestra are too prolonged because of reverberation, successive sound impulses have a tendency to run into each other with a loss of intelligibility and clarity to the listeners. Under these circumstances an unsatisfactory condition is merely exaggerated by the reenforcing equipment.

It then becomes necessary to reduce the reverberation by increasing the amount of sound that is absorbed at the point of each reflection. This is commonly accomplished by the use of absorbent acoustical materials on the ceilings and walls which, by increasing the absorption, diminish the reverberation time.

Because of the widely varying characteristics of rooms and their uses no simple formula can be offered in determining desirable reverberation times. The size and shape of the room, the kind of program it must accommodate, and the size of the audience are all considerations. The frequency 512 cycles per second is generally used as a base.

New Cadmium-Mercury Lamp Bows in Studios

INVOLVING a "wedding" of cadmium and mercury vapor in a slim quartz tube, a new electronic lamp developed by Westinghouse Electric Corp. is considered by some eminent engineers as holding the promise of a revolutionary change in motion picture set lighting technique as well as eventually finding other important uses. Under development for several years, a 1000-watt lamp has successfully passed numerous test shootings during the past year in the studios of Samuel Goldwyn, Technicolor and others.

Gregg Toland, noted cameraman, conducted many of the experiments. Additional studies were made at Technicolor and others. In large measure, data yielded by these tests provided the key to the proper combination of metallic vapors for the cadmium-mercury lamp.

The new lamp was developed to afford the film industry a better, cooler and smaller high-intensity light source. Designed to simplify the problem of lighting movie sets while minimizing excessive heat, the experimental lamp was 14 inches long, 3½ inches in diameter and tubular in shape. Numerous mixtures of cadmium and mercury were tried during the tests.

Shorter Arc Types Coming

Cadmium-mercury lamps of much greater power now are being developed to incorporate lessons learned from the test lamps. When they go into production, these lamps will boast shorter arcs which will provide the controlled, narrow light beams needed for scene highlights and spotlights.

High-intensity mercury vapor lamps as developed by Westinghouse provide the most brilliant, long-burning light source of their type known. The only hitch in the lamp containing mercury alone is that its deficiency in the red hues makes it unsuitable for movies. Under mercury light, red lips and flesh assume an unnatural appearance, even in black-and-white photography.

By adding an undisclosed amount of metallic cadmium to the mercury in the quartz inner bulb of the new lamp, red, more yellow and other colors supplement the blues and greens predominant in the mercury light. This "wedding of the metals" provides the numerous wavelengths of light to which color film emulsions are sensitive and results in high-quality color as well as black-and-white pictures.

Spectral Deficiency Corrected

"Ever since the advent of color motion pictures," said Charles R. Long, Westinghouse development engineer, "the studios have sought lamps smaller, cooler and simpler than the widely used sources for set lighting. We expect that the new cadmium-mercury lamp will influence greatly movie set lighting practices. More powerful sizes to come will vastly increase set lighting brightness and should prove another step forward in the constant search for better color and black-and-white cinematography."

New S.M.P.E. New York Offices

Headquarters of the Society of Motion Picture Engineers in N. Y. City have been moved from the Hotel Pennsylvania to the Canadian Pacific Building, 342 Madison Avenue (44th St.) where larger quarters have been leased on the ninth floor to accommodate the rapid growth of the Society and recent additions to the office staff under Executive Secretary Boyce Nemec. The new telephone number is MUrray Hill 2-2185.

Engineering and editorial work of the Society, conducted in separate offices away from headquarters during the past several months, will now be reassembled in one location where it will be possible to give greatly improved service to the membership and the industry at large.

Kodak Silver Usage Rivals Mint

More than 12,000,000 ounces of the world's purest silver are used each year by the Eastman Kodak Co. for photographic purposes. Outside of the U. S. Mint, Kodak uses more silver than any other company or organization.

Tom O'Brien: British Film Firebrand

WHEN the 75% tax was announced in England, levied at the importation of American motion pictures, a stocky, keen-eyed member of Parliament rose to his feet and with all the oratory of the Irish plus the poetry of the Welsh protested loudly. It would mean the loss of jobs for those he represented in British labor. It was a dangerous thing politically, however, because he was Tom O'Brien, M. P. for the Labor Party.

That was the Tom O'Brien who last September came to the United States to meet with I. A. officials to discuss mutual problems, and who left behind him here many admirers and friends. But just who is this Tom O'Brien?

Forty-six years ago in Llanelly, South Wales, Tom O'Brien was born of an Irish father and a Welsh mother. He was schooled in Llanelly, but is really a self-educated man, an eager reader and a student of political economy. He always says that the labor unions have to know as much about business as the employers.

For 26 years Tom O'Brien has been a full-time official of his union. He is now General Secretary of the National Association of Theatrical and Kine Employees (NATKE) and a member of the Trade Union Congress General Council, parent body for all of the leading unions. O'Brien first joined the old Workers' Union and the National Union of General and Municipal Workers before he went into the theatrical industry in 1919. It was in that year that he joined NATKE.

J. P. McEvoy, Roving Editor for *Reader's Digest* perhaps best symbolized how Tom O'Brien rose so fast, both in politics and in union work, when he said: "Tom, I can see why you can handle both the employers and employees in this mad business. It's because you are a better actor than any one of them."

This is true. In Britain, O'Brien is known as one of the most dynamic and powerful speakers. He uses every trick of oratory—but backs it up with sound and solid judgment and knowledge.

The ubiquitous Tom O'Brien, M.P.



Tops His Craft at 31

His labor record is long but simple. He became District Organizer for South Wales and the west of England for NATKE in 1921, and three years later was promoted to be National Organizer. In 1932 he was elected to be General Secretary, the chief full-time executive—the youngest General Secretary of a national trade union in England. He still holds this record.

In 1940, during the war, O'Brien was elected to the General Council of the Trade Union Congress and has been a member ever since. He now serves on the Council's Organizing Committee; Trades Councils Joint Consultative Committee; Rationing and Prices Committee; Scientific Committee; Non-Manual Workers' Advisory Comittee; represents the Council on the Executive Committee of the National Playing Fields Association; the British Workers' Sports Association; the Workers' Film Association (of which he is a past President); and during the war was on the Advisory Committee to the Minister of Information.

Among his other posts are membership in the Cinematograph Films Council, and he is also President of the Federation of Theatre Unions, which comprise the British Actors Equity Association, the Musicians' Union, and NATKE. He is also President of the Film Industry Employees' Council, which is composed of the Association of Cine-Technicians, Film Artists' Association, the Musicians' Union and NATKE.

In 1944, during the war, he was elected by the Trade Union Congress General Council to be sent with Mr. Will Lawther, head of the powerful British Mine Workers', to Italy to advise the Italian workers on the establishment of a democratic trade union movement. This was during the fighting, and the two unionists went up front and really saw action.

In 1945 he was one of the British Trade Union Congress representatives to attend the first Congress of the World Federation of Trade Unions in Paris. The next year—in April, 1946—he was sent as the British Trade Union delegate representing all unions to the Czechoslovak Trade Union Congress in Prague. Last year he came to America as the first post-war delegate from the Trade Union Congress to attend the convention of the A. F. of L.

Elected M.P.; Employer Tribute

In 1945, in the general election which overthrew Winston Churchill and put the Labor Party into power, Tom O'Brien was elected to Parliament. It was a three-cornered contest, but O'Brien won by a majority of 15,000 votes. Not only were the Unionists behind him, but the ex-servicemen as well. Tom O'Brien himself is a war veteran, having run away from home in 1915 to join the British Army and to serve on active duty in the famous Dardanelles Campaign when only 15 years of age.

O'Brien is the father of four children, the eldest son having served in the R. A. F. in the Middle East during the last war.

He is known as the firebrand of the film industry. But the most powerful figure in the film industry, J. Arthur Rank, once said about Tom O'Brien:

"Tom is on the other side of the fence, but he is an honest man and he is for the good of the business. You can sit down with Tom and talk out the problems and you can depend on knowing where you stand and having a forthright answer from him at all times. Tom O'Brien has been great for the unions—great for the workers—and therefore great for the motion picture industry in Britain."

That, from his opposition, is truly a tribute.

IN THE SPOTLIGHT

(*Continued from page* 21)

sick leave. . . . Local 95, Ottawa, Canada, celebrated its 20th anniversary. . . . Beaumont, Texas, Local 183 reported that a three-year effort to unionize the theatres was successfully terminated with the signing up of all theatres in its jurisdiction. . . . Immediately after attending the California State Federation of Labor meeting, Representative Newman left for Arizona to take care of matters that required his attention. . . . Motion picture theatres in New York City reported increased patronage. . . . Representative Magnolia adjusted the difficulties that arose between Local 396, Binghamton, N. Y. and a theatre manager regarding salary to be paid a relief man. A compromise was reached and the matter satisfactorily settled. . . .

• IA projectionists will man the machines showing motion pictures at all meetings of the United Nations held in and around Greater New York. Contracts were issued to New York City Local 306, represented by Ben Scher, and Nassau County Local 640, represented by William Nagengast, giving each projectionist $25 per day, on a six-hour day basis. It is expected that many more projection rooms will be utilized by the United Nations within the next year or two, thus providing more jobs for our men.

Order Your Copy of

Projectionists'

$3.00 **SERVICE MANUAL**



Left to right: IP's Harry Sherman; W. D. Hausler, L. W. Davee, Century Projector Corp.; R. W. Ramsey, Carolina Equipment Co., Charlotte, N. C.; A. Boudouris, Theatre Equipment Co., Toledo, O.; M. Pearce, Century Projector Corp.



Left to right, front: E. R. Geib, C. Handley, D. B. Joy, C. O. Kleinsmith, National Carbon Co. Rear, left to right: W. B. Kunzman, National Carbon Co.; Lloyd Mannon, Control Engineering; W. W. Lozier, P. D. Reis, C. E. Heppberger and J. P. Nolan, National Carbon Co.

TESMA–TEDPA ALL-TIME HIGH



Left to right: Lloyd Mannon, Control Engineering; W. W. Lozier, National Carbon Co., and Harry Sherman.

EASILY the finest equipment show ever staged in this industry, and on a par with the best held in other fields, was the recent joint TESMA-TEDPA Convention held at the Shoreham Hotel, Washington, D. C., Sept. 24-29. With 65 exhibitors vieing strenuously with each other to capture the attention of the Convention visitor, with a series of business sessions and open forums which contained real meat in a factual sense, and with demonstrations continuing almost continuously, this trade show notched an all-time high.

The reelection of Oscar Neu as president of TESMA, and of Ray Colvin to head TEDPA, was an honor richly deserved by both of these men who contributed so much to the success of the gathering. Incidentally, prexy Neu predicted that next year's gathering in St. Louis would see the TEMA membership role swell to 300, a surprising figure for so specialized a field.

The one critical note sounded anent the show was that all exhibits and general activities favored the supply dealer rather than ultimate consumers such as owners, managers and projectionists. Oscar Neu promises that future shows will give no reason for such criticism.

No such critical view was taken of the RCA activities at the meeting, this group being in there pitching every minute. Top feature of the show was a large-screen television demonstration for which RCA piped in from New York the boxing matches at Madison Square Garden. Shown on a screen 6 by 8 feet, the technical quality of the images was none too good, but it so happened that the main bout was such a thriller as to keep the spectators on their toes.

Harry Strong, of Strong Electric Corp., got a tough break when his equipment failed to arrive in time to be displayed. The sporting manner in which Harry took this jolt, however, minimized to the vanishing point the ill effects of the mishap.

Among the projection people who ex-

Representing Nu-Screen Corp.: Fred R. Gluckman, Otto Hehn, Herman Gluckman, and Stanley Hand.



Left to right: Thor Matthews, Motiograph, Inc.; H. J. Ringold, Ringold Theatre Equipment Co., Grand Rapids, Mich.; J. Behlke, member Chicago L. 110; Douglas and Fred C. Matthews, Motiograph, Inc.



hibited at the meeting were the following:

DeVry Corp. showed a full line of amplifiers, speakers and projectors, in addition to their new Hypex weatherproof outdoor speaker and their in-car speakers.

Kollmorgen Optical Co. had a swell display featured by a cut-away showing in detail the construction of their new F:1.9 Super Snaplite lens. Emphasized were the one-piece mount, the anodized finish, and the all-aluminum construction. Baldor Electric Co. displayed their new Rect-o-Lite rectifier which features no moving parts and two 7-point control dials for quick regulation. Blue Seal Cine Devices exhibited the new Model A projector, described in IP last month. Kni-Tron showed various rectifiers, including a portable model designed to save space in the projection room.

Ballantyne Co. displayed a full line of Royal Soundmaster sound systems for all types of theatres, in addition to projector bases, amplifiers and a new 40-65 ampere Suprex arc lamp.

Jim Elderkin, of Forest Electric Corp., showed for the first time publicly a complete version of his new Electronic Arc Lamp featuring hairline control of arc feed. GoldE of Chicago offered a line of spots, including the Rotachrome featuring six continuous color changes.

Altec Lansing's pride and joy, the new "800" Voice of the Theatre Speaker for houses up to 1000 seats, grabbed top honors in that section. Also shown were amplifiers and a complete line of speakers for every theatre classification.

Century Projector Corp. again had the most novel projection display *via* a stripped-down version of a head moving so slowly as to clearly show the action of the intermittent. Complete "Master" sound systems were also on view. Fontaine Mfg. Co. showed a Q Marker with built-in stainless steel scribers designed to completely eliminate film mutilation.

Lloyd Mannon of San Francisco (Local 162), head of Control Engineering Corp., demonstrated on a standard projector operating setup an improved and beautifully-finished version of his Safety Control providing for instantaneous positive cut-off action of the film. (This unit has been described in detail in IP.)

J. E. Robin, Inc., displayed the Robin-Imperial rectifiers and generators, the former being a six-phase job featuring control of the D.C. in 2-volt steps.

Oscar Neu (Neumade Products) must sell everything but the theatre walls, judging by his display and voluminous literature. He featured the new Firetite Cabinet for 2000-foot reels which, built like a vault with a 1½-inch double wall of heavy gauge steel, resists flame completely.

Motiograph again scored both on the exhibition floor and in their private quarters. Downstairs they showed the complete line of Mirrophonic sound systems in addition to the new AA projectors. Upstairs the Motiograph quarters took on the aspect of a branch of the I.A., there being so many Local business agents and other projectionists always present as to suggest a national convention quorum.

The LaVezzi boys from Chicago displayed a beautiful line of projector parts and patiently explained again and again, even to the non-technical folks, the how and the why of precision workmanship and its bearing on good screen results. These fellows gained themselves a host of friends. Nu-Screen Corp. was represented by Stanley Hand, who related the fine points of this new curved screen.

Essannay Electric Mfg. Co. (the late Larry Strong's outfit) exhibited the Strong Zipper changeover, a new reel-end signal which, not touching either film or reel, can be used with either 4- or 5-inch reels, and the all-purpose film splicing agent Film-Weld. This exhibit was in charge of Miss Milly Markert.

The Wenzel Company gave "Ace" representation to their projectors and complete line of projection accessories. A very useful parts catalogue, distributed at the convention, may be had by addressing 2507 So. State St., Chicago.

Ashcraft Mfg. Co. had on hand the brand new C-70 Suprex projection lamp designed for wide-range operation from 40 to 65 amps. With a cast aluminum housing, all working parts outside the housing, precise control by means of a novel duplex clutch, and many other operational features, this unit induced much favorable comment.

Manufacturers Machine & Tool Co. displayed the new flickerless 35-mm projector which may be operated on either A.C. or D.C. Running at 1880 r.p.m., the novel drive and gearing arrangement of this unit reflects fine engineering skill.

Always worth while, this joint TESMA-TEDPA is building up year by year to a point where it will be practically compulsory for the alert technician to attend in order to keep abreast of current developments. IP considers these meetings one of the finest things that ever happened in the equipment field, reflecting great credit on the sponsors.

This report would not be complete without a bow in the direction of Roy Boomer whose secretarial chores continue throughout the year and whose efforts contribute vitally to making these meetings so eminently successful.

I. A. Election

LOCAL 548, PARIS, TEXAS

D. T. Davis, *pres.;* R. C. Vallier, *vice-pres.;* W. T. Crawford, *bus. agent;* E. P. Lehnhoff, *sec.-treas.;* W. T. Crawford, *del. IA Convention.*

Seated at one of the tables at the TESMA-TEDPA banquet, left to right: Thor Matthews, Motiograph; Harry Sherman, I. P.; W. C. DeVry, DeVry Corp.; C. O. Kleinsmith, J. W. Nolan, National Carbon Co.; J. Servies, National Theatre Supply Co.; L .Kenneth Mayer, Mfrs. Machine & Tool Co.; Lloyd Mannon, Control Engineering; Harry Hollander (standing), member New York Local 306; Jack O'Brien, RCA; L. W. Davee, Century Corp.; and Fred Matthews, Motiograph. Seated in front, J. R. Little, RCA, and Millie Markert, Essannay Mfg. Co.



TELE FEATURES SMPE MEET

(*Continued from page* 16)

quency of 800 cycles. Improvement is obtained in uniformity of distribution and reduction of size and weight.

Synthetic Sound on Film, by Robert E. Lewis, Armour Research Foundation of Illinois Institute, and Norman McLaren, National Film Board of Canada. An analysis of both hand-drawn and machine-made sound tracks is presented together with methods. Synthetic sound tracks enable the composer to hear his composition as written rather than through another artist's interpretation.

5 Million Frames Per Second

Motion Picture Photograph at Five Million Frames Per Second, by Brian O'Brien and Gordon G. Milne, Institute of Optics, University of Rochester. A new procedure is used in which the image of a rectangular picture is broken up and reassembled into a long narrow strip. After processing, the negative must be reconstructed into a rectangular motion picture frame by projection printing through an optical system similar to that which formed it. Characteristic films will be shown.

A Versatile Measuring Instrument Designed for Theatre Sound Service, by C. S. Perkins and E. S. Seeley, Altec Service Corp. A multifunction indicating instrument has been developed to meet the particular needs of theatre sound service. Requirements of accuracy and compactness are satisfied in a design which achieves unusual sensitivity and versatility.

A Continuously Variable Band Elimination Filter, by Kurt Singer, RCA Victor Division, Hollywood. A band-suppression filter, continuously variable from 35 to 9000 cycles and capable of eliminating a very narrow frequency band within this range, has been developed. Any frequency between 35 and 9000 cycles can be attenuated at least 50 decibels. The application of this device in a studio film recording channel, is discussed.

A Modern Sound Reinforcement System for Theatres, by C. E. Talley, Roxy Theater, N. Y. City, and R. W. Kautzky, Altec Service Corp. This paper describes a system recently installed in the Roxy Theater, New York City, which incorporates a control console of unusual design, equipped with mixers and volume controls of a new type and a method of effecting a stereophonic pickup and reproduction.

The Development of Theatre Television in England, by A. G. D. West, Past-President, British Kinematograph Society, Director, Cinema-Television, Ltd. Historical review of the progress of theatre television in England and a description of the design and performance of equipment developed for distribution and projection of television programs.

The Gaumont-Kalee Model 21 *Projector*, by L. Audigier and R. Robertson, A. Kershaw and Sons, Ltd. A description of the main features of the design of the projector which will be on view.

The Activities of the SMPE in Theatre Television, by Paul J. Larsen, Chairman, Committee on Television, SMPE. Transactions of the SMPE in the interests of promoting theater television; briefs filed with the Federal Communications Commission.

Report of SMPE Committee on Screen Brightness, by E. R. Geib, Chairman.

The Role of the Theatre Dimmer in the Neighborhood Motion Picture House, by D. M. Rollins, Ward Leonard Electric Co. A discussion of resistance versus inductance-type dimmers.

Report of Film Projection Practice Committee, by G. T. Lorance, Chairman.

Theatre Safety, by Walter Cutter, New York University. A general discussion on theatre safety led by Henry Anderson, Paramount Theatres.

Large-Screen Television, by Engineers, Radio Corporation of America. Latest



"PHIL-KRON" Model Drive-In Typical of Theatres Selecting "12000 Series"

In 250-seat to 6,000-seat theatres—in "drive-ins" with up to 1,000-car capacity—DeVRY's "12000 Series" installations are today helping achieve new highs in audience satisfaction.

Pictured is the "PHIL-KRON" Drive-In Theatre, which occupies a 15-acre tract at the junctions of Routes 51 and 66, Bloomington, Ill. This model drive-in is attracting Exhibitors, Architects and Contractors from all parts of the country . . . and setting box office records for the community. "PHIL-KRON" selected DeVRY's for their effectiveness in throwing a perfect image to the 37 x 42 ft. screen; also for the efficiency of DeVRY's improved In-Car Speakers that achieve a new standard of sound excellence, for their 850-car capacity theatre.



NEW DeVRY In-Car Speaker

Among the theatres in which recent installations have been completed are: Bradenton Drive-In, Bradenton, Fla.; Park Drive-In Theatre, Toronto, Canada; Roxy Theatre, Concord, N. C.; Cankton Theatre, Sunset, La.; New Era Theatre, Harvey, Ill.; Princess Theatre, Colchester, Ill.; Crisp Theatre, Gainesville, Mo.; Donk's Theatre, Hudgins, Va.; Sunset Drive-In, Clarksburg, West Va.; and new Drive-In theatres at Steubenville, Ohio and Fort Wayne, Ind.

You, too, will want to know more about this sensational new equipment that gives you so much more of what you want to help achieve the "perfect show"—and for such a moderate price. See them at the DeVRY theatre supply dealer or actual installation nearest you. The trend definitely is to DeVRYS!

In Canada contact Arrow Films, Ltd., 1115 Bay Street, Toronto 5.

Only 3-time winner of Army-Navy "E" award for motion picture sound equipment. DeVRY CORPORATION, 1111 ARMITAGE AVE., CHICAGO 14, U. S. A.

type of experimental research laboratory large-screen television projection equipment.

Some Aspects of Large-Screen Television, by Alfred N. Goldsmith, consulting engineer. Problems to be faced by the exhibitor in the installation of large-screen television equipment; suggestions about possible types of installation that would prove suitable.

Auditorium Acoustics, by J. P. Maxfield, consulting engineer. A review of the acoustics of auditoriums with special emphasis on motion picture theatres and an outline of the best conditions for dramatic and aesthetic presentation of programs.

A Professional 16-mm Projector, by E. W. D'Arcy, DeVry Corp.

Acoustical Factors in the Design of Motion Picture Equipment, by Howard C. Hardy, Armour Research Foundation.

A Projection Lamp with Improved Carbon Clamps and Feed Mechanism, by Ben Hopkins, Hopkins and Woods, Indianapolis, Ind. This lamp is designed to accommodate carbon trims suited to arc currents between 40 and 65 amperes without carbon-holder changes. Relative carbon-feed rates are easily adjusted exactly to match burning rates; correct arc positioning and length are maintained automatically over a considerable range of variations in conditions external to the arc.

Among the companies who will have exhibits at the Convention are the following: Kollmorgen Optical Co., Western Electric Co., Altec Lansing Corp., National Theatre Supply Co., General Electric Co., Ward Leonard Electric Co., Westinghouse Electric Co., Eastman Kodak Co.

Also Forest Mfg. Co., Nu-Screen Corp., DeVry Corp., LaVezzi Machine Works, McColpin-Christie Corp., G. B. Kalee, Ltd., Blue Seal Products, and Robin, Inc.

Safe Concentrations of Carbon Tet

Although not applicable to the great majority of workers in the film exhibition field, the following notice from the U. S. Dept. of Labor is published here for benefit of those who may be affected thereby:

"There is a difference of opinion among authorities as to the maximum allowable concentration of carbon tetrachloride. The opinion of many authorities in this field seems to be that not over 100 parts per million constitutes a safe limit. To hold peak fluctuations below this level, an operating mean of 50 p.p.m. is recommended.

"This correction is made because it has been called to our attention that the American Standards Association has not officially set 100 p.p.m. as the limit."

Two New Projection Aids By Dawson-Day of Detroit

Two interesting projection items are now in production at Dawson-Day Devices, of Detroit—the Projectionist's Pal, a rewinding aid, and the Steady-Arc Baffle which is intended to increase the efficient operation of arc lamps.

The "Pal" is an adjustable rewind dog that is warranted to rewind any and every type of double and single reel with a minimum of effort and a maximum of safety. The driving button on this dog may be changed within three seconds without the use of a tool for switching from single to double reels. Fitting any standard motor rewind shaft, this dog prevents broken rewind keys.

The Steady-Arc Baffle has proven very popular in locations where trouble has been encountered with unsteady arcs and where increased ventilation is desired. This baffle reduces trouble arising from excess air being drawn directly across the face of the positive carbon, the while permitting more air to circulate through the lamp. A cleaner and cooler lamphouse and reflector, and, of course, a steadier arc will result.

Full details are available from Dawson-Day at 150 West Euclid, Detroit 2, Mich. This firm, incidentally, is composed of two oldtime members of Local 199.

FLICKER

was the least of his worries



Among the hundreds of headaches in early motion picture projection, flicker was a minor matter. Today, audiences are more critical, but flicker can still be the least of your worries if you use General Electric copper-oxide rectifiers. This reliable equipment is designed especially to insure the steady, uniform power that is needed for fine reproduction of modern films.

Order from your General Electric Distributor, or write for additional information to Section A81-1045, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Conn.

GENERAL ELECTRIC

RECTIFIERS

For Motion Picture Projection Service

METAL MIRRORS: NOTES ON MAINTENANCE

The accompanying notes, intended to serve the needs of many inquirers, were compiled by Heyer-Shultz, Inc., pioneer workers in the field of metal reflective surfaces.

ONCE a metal mirror is installed it does not have to be removed from the lamphouse for cleaning. It may be cleaned in place while hot or cold. As these mirrors do not pit, they are extremely easy to clean. Enclosed in each shipping case is one 2-ounce container of cleaner (Bon Ami). This particular cleaner is recommended because:

1. It is non-inflammable; 2, it is inexpensive and easy to obtain, and 3, it is a foolproof cleaner not affected by time or temperature.

Before cleaning, dust the mirror lightly with a clean dry cloth to remove carbon dust and other particles of loose material from the face of the reflector. Sprinkle cleaner on a wet rag and rub into a paste, apply to surface and wait until dry; then remove with clean dry rag.

If applied to a hot surface, the water will steam off instantly and no waiting will be necessary. Do not be afraid of applying wet cloths to the very hot surface, as it will not harm the all-metal reflector in any way.

Scratching of No Consequence

As the all-metal reflector is a first-surface mirror, the thought comes to mind that in continual cleaning abrasive particles must find their way into the cleaning process and leave scratches.

This is very true, but of no consideration. Scratching is noticeable to the eye on the highly polished finish; but in a test conducted to determine just how serious an efficiency loss is encountered, it was found that after scouring a new reflector with sand until the entire surface was covered with these marks, a loss of only 4% was effected, a condition that is definitely more extreme than that to be found in normal projection practice.

It is of interest to note that rhodium (the reflecting surface of the all-metal mirror) has a Rockwell hardness of 90, whereas tool steel has a hardness of only 60.

The specifications for each model all-metal reflector accompany each mirror, and it is important that they be set up in the proper working distance outlined for each model. To determine a perfect focus it is suggested that a pinhole (approximately .048" in diameter) be inserted at the aperture in a central position and a white card held just in front of the objective lens, where a picture of the reflector will appear.

When perfect focus has been accomplished, a clear white field will appear on the card. If the focal distance is long, bluish areas will be evident; and if the reverse is true, yellowish and brown areas will appear. This test will enable the projectionist to set up his lamp without projecting a picture to the screen.

Booklet Terms Application

In the specifications booklet, "working distance" is the measurement from the first surface of the reflector at the center hole to the aperture. "Focus" is the measurement from the crater floor of the positive carbon to the first surface of the reflector at the center hole.

All the figures given for working distance and focus for simplified high-intensity are computed from an 8-mm positive carbon operating at specified current density for this size carbon. The working distance may be increased approximately ½ inch for each millimeter smaller positive carbon. These distances are all computed to cover standard projection lenses of average equivalent focus and speed.

PROJECTIONISTS' SERVICE MANUAL
$3.00



1. Don't fool yourself, sound trouble *could* make this happen at your theatre.



2. And result in lost receipts that bring on box-office blues.



3. Regular checkups by RCA experts avert trouble—assure high-quality sound.



4. Continual, high-class showings please patrons—bring them back.

How to put an end to box-office blues

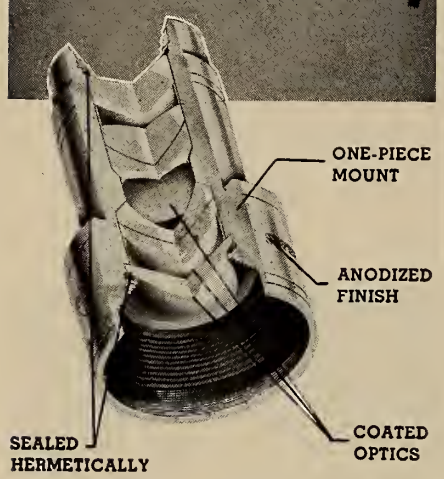
When you buy RCA Service, you assure yourself of trouble-free operation, economical upkeep, and Academy-approved tone adjustments for your sound system.

In addition to regular checkups by a skilled, well-equipped technician—you get fast service on parts—prompt help in an emergency.

Unload your sound equipment problems on RCA Service specialists. For the cost of a few admissions per day, you may prevent box-office blues.

RCA SERVICE COMPANY INC.
RADIO CORPORATION of AMERICA
CAMDEN, N. J.

HERE'S WHY THE
SUPER-SNAPLITE
IS UNEXCELLED!



SIX ELEMENTS ...
A true Anastigmat for pictures wire-sharp to the very corners ... in black-and-white or color!

SEALED HERMETICALLY ...
No dust or oil can enter the Super-Snaplite ... it never needs to be taken apart for cleaning!

ONE-PIECE MOUNT ...
This sturdy all-aluminum one-piece mounting can't loosen up or leak oil!

ANODIZED FINISH ...
The gleaming gold finish of the Super-Snaplite is an integral part of the aluminum ... it can't chip or flake off!

COATED OPTICS ...
Durable anti-reflection coating on each glass-to-air optical surface nearly *doubles* the light transmission ... gives brighter pictures, higher contrast!

SPEED OF f/1.9 ...
Exceptional speed for the utmost in screen brilliance without extra current consumption!

OTHER SNAPLITES ...
The f/2.0 Snaplite Series II—hermetically sealed ... critical definition ... coated optics. For smaller theaters: the f/2.3 Snaplite Series I—coated optics optional. For complete details on all Snaplite lenses, get Bulletin 204 from your local supply dealer.



KOLLMORGEN Optical CORPORATION
2 Franklin Ave.
Brooklyn 11, N.Y.

AMERICAN TRADE UNIONS

(*Continued from page 6*)

of the law were more active in its enforcement.

In England at one time, under the so-called conspiracy statutes, workmen found guilty of collective activity with fellow workmen were branded with hot irons, some had their noses slit while others were cut off, one or both ears were cropped, and many were imprisoned. But all this only made workmen more determined, and finally, instead of trade unionism being suppressed, the conspiracy statutes as a whole, as they applied to labor, were repealed. Trade unions were made legal organizations.

Unions as a 'Conspiracy'

After the craft guilds of the medieval period had run their course, there was a time during which labor organizations largely vanished. Workmen were exploited, sometimes mercilessly, by employers and the authorities. For the time being the employers were becoming more influential in public affairs, and more powerful industrially. They made the rules of the new industrial relationships being created by the industrial economic trend of the period. They made the rules, and labor obeyed or suffered the consequences.

The masters were in the saddle. They rode upon the back of labor without conscience. Their action produced reaction on the workers' part—definite, vigorous action. They organized surreptitiously. Some were caught in the meshes of the law, some were transported to Australia (the Tolpuddle Martyrs). They organized in defiance of the conspiracy statutes. Had they obeyed these labor-enslaving laws they would have been unable to arouse public opinion sufficiently to have them repealed by Parliament in 1824-25.

This reference to English trade unions and legislation is of importance because modern trade unionism had its birth in England. England was the mother of trade unionism as Germany became the center from which the economic and social theories of Karl Marx spread throughout the world. Each has influenced the other, as will be found when the growth of trade unionism in the United States is being examined.

While the printing press was of little service to the early spread of trade unionism in England, there was a far-reaching influence of its purpose through word-of-mouth, the casual discussion of their grievances when workers met. There was discussion in the taverns where the workers congregated. In fact, many of these taverns were the workmen's clubs, the only places where they could meet in the cities and towns, for there were no other rooms or halls available to them.

Workmen came to understand that their only hope for protection must come from their own collective effort. They grasped the necessity for united action. So the principles of the brotherhood of labor gained headway. Their organizations were formed locally without any central organization to assist them. Each union stood upon its own strength and the loyalty of its members.

The ferment of revolt against exploitation by their masters was actively working, firing the workers' minds with the determination to achieve their industrial liberty. Probably that ferment was of the same quality which had led other men to work and risk their lives so that the system of government by royalty (special privilege and discretionary authority) could be overthrown and parliaments established in its place.

'Friendly Society' Subterfuge

As the labor ferment stimulated the workmen's minds, they endeavored to emerge from their secret, surreptitious organizations into the open. Their subterfuge was to incorporate sick, death and other fraternal features in their unions and to call themselves "friendly societies" (fraternal organizations). Many of the stringent rules binding

Huff's WATER ELECTRIC
POSITIVE CARBON COOLER
for MIRROR ARCS

• More Light on the Screen • A Whiter Light
• Less Heat at the Film

HUFF'S MFG. CO. 659 W. Jefferson Blvd. Los Angeles, Calif.

the membership under most solemn oath to reveal none of the union's transactions were to prevent the trade union character and purpose of their "friendly society" from becoming known to other workmen, the employers and the authorities.

The growth of these early unions was a natural process, stimulated only by the everyday problems which the workmen faced. They had no records of past unions to guide them, though there must have been preserved some traditions relative to the craft guilds of the medieval period. No uplifter, moved by an urge to save humanity, had prepared blueprints of the proper way to organize and direct trade unions.

Wage-earners, in the beginning, organized because of their necessities. It was their only way of preventing employers from pitting one against the other, to divide labor so that it would be unable effectively to assert and protect itself.

Where a few craftsmen were employed in a community, the common interest in their terms of employment and conditions of labor led them to agree among themselves not to work for less than a certain wage. They were without means of definitely enforcing such understandings as they reached among themselves, yet they were successful in improving their standards of work and of living.

It was under such conditions that the craftsmen in colonial New England endeavored to protect themselves from those who desired their skilled service, but were unwilling to pay the wages to which the craftsmen believed themselves entitled.

It was without the benefit of formally organized trade unions that the colonial craftsmen were able to secure wages for their skill, to the dismay of the "irked" colonists in Massachusetts Bay Colony, and to "the dishonor of God, the scandal of the Scriptures and the grief of divers of God's people".

Unions Formed on Seaboard

Shortly before the Revolutionary War a few local trade unions had been organized along the Atlantic seaboard. Most of these became active in the resistance being made to the mother country. Among these were tailors, boot and shoe makers, iron molders, printers, carpenters and wooden shipbuilders.

In Boston the ship's caulkers had a separate union with its own hall, the Caulkers' Hall. Aside from the public meetings in Faneuil Hall and the Old South Church, the Caulkers' Hall was the private meeting place for such Revolutionary leaders as Samuel Adams, James Otis, Paul Revere, Warren and other leaders of the Sons of Liberty and similar patriotic organizations for resistance to Great Britain.

These frequent meetings, these conferences between the leaders for revolt in the Caulkers' Hall, so authorities inform us, gave to our language a new word for certain types of conference, the term "caucus". This new trade union movement—a purely American development, for it was not imported from abroad—did much more than give the English language a new term, however.

[To be Continued]

PROTECT THE PRECISION of your Simplex projectors!

T.M. REG. U. S. PAT. OFF.

USE ONLY GENUINE Simplex PARTS



NOW AVAILABLE FOR IMMEDIATE DELIVERY

NATIONAL THEATRE SUPPLY

Division of National • Simplex • Blackmer, Inc.

EQUIPMENT AND SUPPLIES FOR EVERY THEATRE NEED

GoldE

Model "D-H" AUTOMATIC ENCLOSED REWIND



U. L. approved . . . eliminates fire hazard. Micro-Switch safety cut-off—when door opens, motor stops! Motor does not transmit torque to operating parts. Reel-drive Dog... prevents broken keys.

Available through Theatre Supply Dealers.

GoldE Manufacturing Co.
1220-R West Madison St.
Dept. R, Chicago 7



Low Maintenance Cost • Positive Friction . . . Will Not Clinch Film

Modern, Compact Design • "Tilt-back" Case . . . Reels Can't Fly Off

PERSONAL

ARTHUR F. BALDWIN, export manager for National Theatre Supply Co., has just returned from an 18,000-mile, 2½-month trip by air through all Central-and Latin American countries where NTS has distributors. He reports the export outlook to be good although complicated by rather severe currency restrictions.

* * *

STEPHEN E. REYMER heads the new motion picture division of Packard and Packard, Los Angeles advertising agency. Formerly chief engineer of a large industrial electronic unit manufacturer, REYMER also served as research engineer for Bell & Howell, in a similar post with Illinois Tool Works, and for 14 years was radio engineer for the U. S. Bureau of Standards.

* * *

ROY P. ROSSER, JR., assistant export manager for National Theatre Supply Co., is now on the first leg of an extensive air tour on which he will visit his company's distributors throughout Europe, Asia, the Near East and the Orient. Covering 40 countries and traveling more than 30,000 miles mostly by air, ROSSER will be gone five months.

* * *

LESLIE F. MORRIS, London operating manager of the Western Electric Co., Ltd., British subsidiary of Westrex, is in New York for a series of engineering conferences.

* * *

EUGENE S. GREGG, vice president and general manager of Westrex Corp., has returned to New York after completing a three-month round-the-world trip which took him to Western Electric offices from London to Wellington, N. Z.

GREGG reports that the foreign market looks upon America as the "miracle" country of the world, and there is a widespread demand for all types of U. S. equipment, American designs being uniformly regarded as best. However, currency controls and import restrictions are making it difficult for exhibitors, producers, and others to buy the needed equipment.

* * *

Two alumni of Altec's memorable hush-hush wartime Mark I Navy anti-aircraft trainer project, have new Altec assignments: RALPH E. PIERCE, lately at Boston, goes to Philly as branch manager, succeeding FRANK EVANS, who goes to Cincinnati in a similar post.

* * *

STANLEY HAND, veteran industry figure and with Altec Service Corp. for the past ten years, has joined Nu-Screen Corp. in charge of national distribution.

* * *

DR. EMMETT K. CARVER has been appointed to the newly-created position of technical assistant to the general manager of the Kodak Park plant, Rochester, being succeeded by DR. CHARLES R. FORDYCE as superintendent of the department of manufacturing experiments. CARVER joined Kodak in 1924 as a research chemist.

Two new RCA appointments in the East Central Region: H. V. SOMERVILLE as Manager, and P. B. REED as Field Sales Manager, both headquartering at 718 Keith Building, Cleveland. REED is well known in the motion picture field, having joined RCA as Photophone service engineer in 1930.

* * *

In accordance with its traditional policy of promotion from the ranks, Altec Service has upped A. A. WARD, vice president of Altec Lansing, to Vice President of the parent company, in charge of manufacturing. WARD, who started his career with Altec as a service inspector in the South, developed an engineering principle which made it possible, at a time of rapid development of sound reproduction, to "face-lift" antiquated equipments and give them performance comparable to the modern sound systems, at the time unavailable to many exhibitors. The formula became known as the "A-Square Modification".



A. J. Ward, vice-president, Altec Service Corp.

Ward's promotion was made at a directors' meeting in New York. Officers re-elected were: G. L. CARRINGTON, president; H. M. BESSEY, vice president and secretary; P. F. THOMAS, treasurer; and R. J. BELMONT, assistant secretary-treasurer.

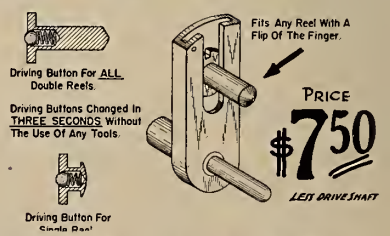


HANDY CHART FOR EASY REFERENCE

Lens Focal Length 16 mm	Projector to Screen Distance in Feet								Lens Focal Length 8 mm
	12′	15′	20′	25′	30′	35′	40′	50′	
	Width of Screen								
¾″	84″	94″	10′	16′					
1″	60″	70″	94″	10′	12′	16′			
1½″	40″	50″	60″	84″	94″	9′	10′	16′	¾″
2″		40″	50″	60″	70″	84″	94″	10′	1″
2½″			40″	50″	60″	70″	84″	8′	
3″				40″	50″	50″	60″	84″	1½″
3½″					40″	50″	50″	70″	
4″						40″	50″	60″	

Showing types of lenses required to fit the varying distances which are most commonly employed in 16-mm projection.

Rewind 'Em All BIG or Small
The Projectionist's "PAL"



No More Broken Keys—Fits Standard Motor-Rewind Shaft

Also—

STEADY-ARC BAFFLES

(for Brenkert Enarc)

$8.50 PER PAIR

AT YOUR SUPPLY DEALER — DAWSON-DAY-DEVICES — OR WRITE DIRECT TO

150 WEST EUCLID — DETROIT 2, MICH.

THE HISTORICAL DEVELOPMENT OF SOUND FILMS

(*Continued from page* 12)

theatrical equipment, came to Auburn to witness the Case talking pictures. He pronounced the demonstration to be perfect, but advised Case that a feature picture would be necessary to sell the system to a producer. Case considered making this.

May, 1926: Case organized the Zoephone Co. to take over and handle the Case system of talking pictures.

Responding to Courtland Smith's suggestion, reproducing apparatus was taken to New York and successful demonstrations given before Fox representatives at Parlor *B* on 10th Avenue, at the Nemo Theater, and at William Fox's home in Woodmere, L. I. Fox was at first suspicious of the process; however, a close-up of a canary bird singing while perched on the top of its cage seemed to convince him that the sound was not a matter of trickery.

June 8-24, 1926: The reproducing equipment was installed in the Fox Film building, 850 Tenth Avenue, N. Y. City. Recording equipment was brought from Auburn, and about 300,000 feet of test records were made in a temporary hair-felt studio room partitioned off on the large stage of the Fox building. The purpose of these tests was to convince Fox of the practicability of making sound pictures under studio conditions. The results were entirely successful.

Fox-Case Corp. Formed

July 23, 1926: An agreement was reached between Case and Fox resulting in the formation of the Fox-Case Corp. In general, Case turned over all patents and rights in his system of talking pictures to the new company (exclusive of amplification, in which he had no rights to give). Case agreed to continue his laboratory for the purpose of making recording lights, photoelectric cells, and for general development purposes.

Aug. 1926: De Forest brought suit against Fox and Case, charging infringement of the Ries recording and reproducing patents, two of his patents covering the use of a gas discharge for sound recording, and a patent on the use of a light-sensitive cell with an audion amplifier.

(De Forest had purchased the Ries recording patent Oct. 15, 1925. He did not, however, actually acquire the Ries reproducing patent until November 16, 1926, although it is believed he held an option on this and several Ries applications before this time.)

De Forest did not press the suit for trial; it was finally allowed to lapse on the court calendar.

Aug. 1926: At the time of the formation of Fox-Case, Sponable came to New York to take part in commercializing the Case system. With him came D. B. Eldred to assist in the business management of the company. Eldred, Case's brother-in-law, had joined the Case Laboratories in 1925. Courtland Smith was made general manager of Fox-Case. "Movietone" was chosen as the name of the sound picture system.

The industry is greatly indebted to Smith for his foresight and agressiveness in hastening the commercialization of sound-on-film. He did more than anyone else to convince the doubting Thomases that sound motion pictures were a reality and that the days of the silent film were numbered. He was instrumental in starting and developing Movietone News and later the Newsreel Theater.

During this time plans were worked out for a sound picture producing unit. Sponable designed and built two studios at the Fox Annex at 460 West 54th St. These were the first studios, except for experimental rooms, wholly designed

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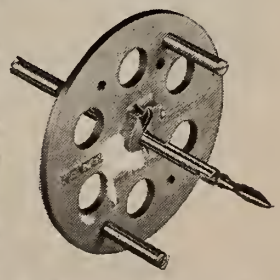
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for sound recording purposes. They were built to exclude all outside noise and with the best acoustic treatment known at the time. Dr. Paul Sabine, acoustic engineer of the Riverbank Laboratories at Geneva, Ill., acted as a consultant in this work.

Sept. 1926: Fox and Smith negotiated with General Electric for rights to use vacuum-tube amplifiers commercially. The deal was nearly completed and G.E. equipment was brought from Schenectady to New York. At the final closing the parties did not agree, and G.E. withdrew their equipment.

*It is interesting to note here that if this arrangement had gone through, the whole setup of the future sound business would have been changed. W. E. would probably have concentrated more and more on disk, and the Fox-G.E. group would have led in the development of sound-on-film.**

Oct. 25, 1926: The first test recording was made on the new Fox-Case stage. The next day a test recording was made of Harry Lauder. Typical of his Scotch character, he stopped singing during the middle of the recording of the song "Roamin' in the Gloamin'" and said, "This is a test"—to be sure it would not be used commercially.

Nov. 4, 1926: Work was begun on making a number of one-reel short subjects with Racquel Meller, using regular motion picture production technique.

Dec. 1926: Prior to this time negotiations were carried on with W.E. to give Fox rights to use their amplification patents and apparatus commercially. These culminated in an agreement or sublicense from the Vitaphone Corp. in which Fox, among other things, agreed to pay a royalty of about 8% of his gross business in the sound field.

Jan. 21, 1927: The first public showing of Fox-Case "Movietone" subjects was given at the Sam Harris Theater in connection with the premiere of "What Price Glory". The sound features were not advertised. The showing was made using a Case sound attachment with W.E. main amplifiers. No stampedes resulted, but neither was there an unfavorable audience reaction.

Feb. 1927: Sponable developed a screen suitable for picture projection and still transparent to sound without causing distortion. This enabled the use of loudspeakers directly behind the screen and was a great help in improving the illusion. This was immediately accepted by the industry.

Feb.-Mar. 1927: The first field recording unit was assembled. With it, outdoor recordings of a West Point review were made and the outfit was then sent to Italy for the purpose of making a record of the Pope and Mussolini.

Mar. 11, 1927: The Roxy Theater, designed by S. L. Rothafel as the "last word" in motion picture palaces, opened in New York. Two weeks after its opening, Fox obtained control of the Roxy and laid plans to convert it for showing sound films.

Fox-Erpi Deal Set

Apr. 1927: Fox-Case made a new agreement with Electrical Research Products, Inc., superseding the Vitaphone sublicense. ERPI had been formed Jan. 1, 1927 as a subsidiary of the American Telephone and Telegraph Company, for the purpose of handling the sound equipment business, instead of W.E.

May 1927: A showing of a West Point review as a sound feature was given at the Roxy Theater.

May 6, 1927: Fox-Case Field Outfit No. *1* recorded a speech by Mussolini and a number of Italian army subjects. This work was done by B. Miggins, cameraman, and E. Kaw and D. F. Whiting, soundmen.

May 25, 1927: A program was opened at the Harris Theater containing Movietone subjects. This included a silent version of "Seventh Heaven" and several sound shorts.

June 12, 1927: Fox-Case recorded the Lindbergh welcome at Washington. Charles Gilson operated the camera,

(*Continued foot of next page*)

* In connection with the early history of sound this work has purposely omitted patents relating to sound-on-disk. Anyone interested can find these described in the *Film Daily* beginning February 24, 1929.



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LETTERS TO THE EDITOR

(*Continued from page* 16)

Sure, there are projectionists who ruin film by cutting the edges for electrical changeover signals, by pasting tinsel on the edges, and by using oversize cue marks and individual scratch markings.

Competent inspection would enable the exchanges to determine the theatre where the damage was done—as in instances of film fires. I never heard of a projectionist being paid, or even thanked, for the time and effort he expends in examining and repairing film so as to put a show on the screen for the exchanges' customers. Did you?

Another "beef" concerns plainly visible framing lens. Why is it not possible to print frame lines that would be visible, especially on fadeouts and leaders? Also, can't trailers be printed with visible standard cues?

MAX H. WINSTON
Kimball Theatre, Yonkers, N. Y.

To the Editor of I. P.:

About the article "Inspection Forms Only Craft Protection Against Film Defects" in I. P. for May:

Small and one-house towns often exhibit film before the big towns do, especially in the summer, and many of these plow-jockeys never heard of a S.R.P. mark. It's not the kids' fault, because these small-towners wouldn't spend a nickel even for a trade paper.

I agree that if the distributors billed theatres for every foot of damaged film, print mutilation would cease abruptly. That Dallas incident proved it. We use a dark crayon for marking film; have for as long as I can remember. Nobody in the audience or on the theatre staff notices these cues, but we're looking for them and thus don't miss them. A clean cloth will erase these crayon marks without any damage to the film.

We simply cut out all mutilated film sections, even if it means the loss of a bit of sound; this happens about 15% of the time. Overall, there are only a few bad boys, but what a whale of a lot of damage these few do. A little determination and pressure in the right places by the distributors and this print hacking would cease—abruptly.

AL KNIPER.
Minneapolis, Minn.

To the Editor of I.P.:

Why would not a device to measure film as it comes off a reel (at inspection time) be practical? I don't remember ever seeing such a device offered for sale. My idea is this:

Mount a counter to the left of the left-hand reel on the rewind bench, the counter to have a soft rubber tire mounted on the end of a suitable adjustable arm long enough to touch the hub of a 10-inch reel. One dial on the counter would be sufficient, numbered possibly from one to 20, the figures representing minutes—or maybe a dial numbered from one to 10 would be O.K.—twice around for a 20-minute reel. There would be three graduations or marks between each figure representing ¼ minutes.

This counter would be quite accurate. A small cable would connect the wheel and crown gears to the counter. The arm could be adjustable, permitting the counter to be mounted close to the reel where space is at a premium.

Has this idea been used before?

GEORGE A. WAGNER
Local 591, Hagerstown, Maryland.

Several such devices have been marketed from time to time over the past 20 years, notably one by Dworsky about 18 years ago. As to their lack of popularity, apparently they all died of the same disease—sales anemia.—ED.

To the Editor of I.P.:

Please accept my thanks for your splendid handling of my series of articles, "Complete Projection Data Charts". In connection therewith you may be interested in the following anecdote:

Promptly this material was brought to the attention of Mr. William Johnson, Graphic Theatres Circuit manager for Maine, he set about adapting material therefrom for information forms for use by all Graphic projectionists. It seems that one of the boys sent in the articles, and Mr. Johnson began using them even before he knew that the author was one of his own projectionists!

IP gets better with each succeeding issue. I don't see how any projectionist can read IP each month and still be satisfied with just knowing and doing enough to get by.

ROBERT A. MITCHELL
Graphic Theatres Circuit, Maine.

E. H. Hansen the sound equipment. The showing of this, together with his take-off and the Mussolini pictures referred to previously, created the second big sensation in the public showing of sound pictures (the "Jazz Singer" being the first).

Sept. 1927: An all-sound program made up of the feature picture "Sunrise" with synchronized score, and the Mussolini pictures, opened at the Times Square Theater. This showing was made on a W.E. sound-on-film installation.

Oct. 28, 1927: The first "Movietone News" was shown at the Roxy Theater. The issue contained the following subjects:

(*a*) Niagara Falls.
(*b*) Romance of the Iron Horse.
(*c*) Army-Yale football game.
(*d*) Rodeo at New York.

[To be Continued]

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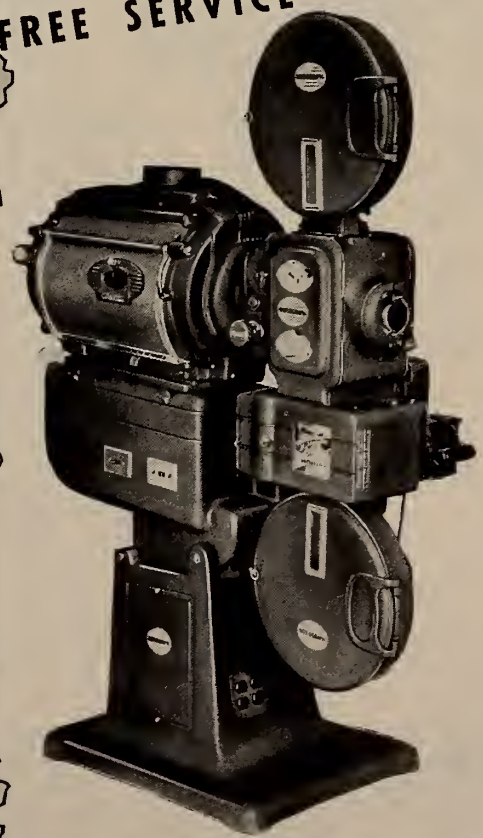
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MODERN PHOTOGRAPHY

(*Continued from page* 18)

tell the story. In the year of "beautiful" photography, many men behind the cameras forgot this and went in for art for *art's sake* and not for art for the *story's sake*, as it should have been.

But now we are in an era of realism where many times we shoot scenes in real settings rather than in fabricated sets. Our lighting is as close to the natural lighting in any particular setting as possible. We are interested in telling the story with the camera as it actually happens and not as we, as photographers, believe it should be stylized.

Visual Story-Telling

In photographing a scene, the cameraman thinks next of "whom to tell on the screen". In other words, he must decide upon his angle and what he is going to shoot. If the scene is a question-and-answer dialogue, the camera must necessarily be on the faces of the players, but a decision must be made on which player. For example, there is the choice between the player speaking and the player listening. In many cases, it would be of greater dramatic value in telling the story to show the reaction of the speaker, rather than the speaker himself.

Modern photography has come a long way in the telling of a story. No longer do we merely photograph what might have been a stage play. Now the camera is being used to tell the story. The old adage of "a picture is worth a thousand words" is as true in the motion picture art as it is in the newspaper business. Today, more and more, we are making fuller use of the camera in telling stories. Dialogue is, of course, important, but directors and cameramen are always recognizing that the full limits of the camera have never been reached.

At all times a cameraman, when setting up a scene, is thinking about composition. The lighting, the position of the players, the setting itself—all of these must be used by the cameraman to aid in telling the story. The lights are not there merely to give proper exposure; the settings and props are not there merely for the players to have a background in which to work. Instead, the many parts must be carefully composed to enhance the dramatic values of the story being told.

Modern photography, as I see it, is natural and realistic photography in which the man behind the camera has used all of the means at his disposal to compose a picture that will tell the particular type of story required.

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A. BUCKLEY

Leeds, Yorkshire, England.

X-Ray Movies Made for First Time

Scientists of the University of Southern California, in collaboration with engineers of several industrial companies, have developed the first successful method of taking X-ray motion pictures at normal and slow-motion speeds. Attempts to make X-ray motion pictures are as old as the art itself.

Efforts to take motion pictures on normal X-ray plates several inches wide resulted, owing to the difficulty of moving such films fast enough, in a maximum of five or six pictures a second; 20 or more are necessary for real motion studies.

Efforts with regular motion picture machines, exposing small frames of film rapidly, ran into the difficulty of synchronizing the camera shutter with the normal cyclical fluctuations of X-ray current which flashes on and off 60 times a second, invisible to the naked eye. To accomplish this, scientists had to harness the X-ray machine and the camera in tandem to such a large electrical commutator that its rapidly revolving "brushes" threw off current that distorted the picture, and patients could be exposed only for very short intervals.

16-mm Camera 'Shoots' Screen

In the U. S. C. system, an ordinary 16-mm camera using regulation film is focussed not directly on the subject but rather on a fluoroscopic screen bearing the X-ray image of the subject's interior. The shutter is adjusted to open and shut 60 times p.s. in synchrony with the current.

The camera actually stands out of the path of the X-ray, with the fluoroscopic screen's image reflected into its lens by a series of mirrors. Normal X-ray current is used, permitting continuous exposures as long as thirty seconds while a tracer chemical courses through the patient's system.

Wartime Technical Reports Index

The third volume of a comprehensive Index to the tens of thousands of reports on wartime technological developments in the United States, in Germany and other foreign countries has been released for sale by the Office of Technical Services, U. S. Dept. of Commerce.

The Index is intended for use with OTS' Bibliography of Scientific and Industrial Reports, published weekly since January, 1946, listing all reports acquired by OTS and containing a brief abstract of each. The Bibliography is on file at most large public libraries and is also available from the Supt. of Documents, Govt. Printing Office, for $10 a year.

Orders for the third volume of the Index, costing 35c, should be addressed to Supt. of Documents, U. S. Govt. Printing Office, Washington, D. C., with remittance made payable to Treasurer of the U. S.

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5 Revised Film Standards OK'd by ASA

FIVE revised national standards in the field of motion picture films, known as Z22, are now available to the public, the American Standards Association has announced. They include cutting and perforating dimensions for 8-mm motion picture negative and positive raw stock, 16-mm silent motion picture negative and positive raw stock, 16-mm sound motion picture negative and positive raw stock, and 35-mm motion picture positive raw stock.

Also included is a revised standard for dimensions for 16-tooth 35-mm motion picture projector sprockets. The standard has been revised with the purpose of lengthening the life of motion picture release prints used in theatres throughout the world.

[The Society of Motion Picture Engineers was the official sponsor of the project, and detailed drawings and specifications appeared in the SMPE *Journal* for August, 1947. The new 35-mm projector sprocket was discussed in I. P. for May, 1947, p. 5: "A Standard 0.943 Intermittent Sprocket."]

Cite Reasons for Revisions

In revising the cutting and perforating standards for film, consideration was given to the improved film manufacturing techniques which have made it possible to set considerably closer tolerances on the principal film dimensions. Special appendices of the revised standards make clear the reasons for the revised dimensions. The Appendix to the four film standards says:

"The dimensions given in this standard represent the practice of film manufacturers in that the dimensions and tolerances are for film immediately after perforation. The punches and dies themselves are made to tolerances considerably smaller than those given, but owing to the fact that film is a plastic material, the dimensions of the slit and perforated film never agree exactly with the dimensions of the punches and dies.

"Shrinkage of the film, due to change in moisture content or loss of residual solvents, invariably results in a change in these dimensions during the life of the film. This change is generally uniform throughout the roll. The uniformity of perforation is one of the most important of the variables affecting steadiness of projection."

Copies of any of these five standards are available at 25 cents per copy from the American Standards Association, 70 East 45th St., New York City, 17.

TELECASTS

(*Continued from page* 14)

and used to modulate its output in the 7000-megacycle band, which is beamed direct to a unique microwave receiver and then channeled to the receiving sets. The pictures presented were of broadcast quality. It was pointed out that with very little modification of the system used in the present tests, the signals received in the valley via the microwave link could be applied to a local transmitter for rebroadcast to homes and public places in the area.

* * *

Dealers Assay Current Bars to Increased Tele Set Sales

IF TELEVISION is to be an early success, the price of receivers will need drastic cutting and the quality of programs considerable improvement, is the consensus of 800 franchised television dealers in the N. Y.-Conn.-N. J. area, according to an extensive survey made by *The Televiser* trade magazine. The public is judged prepared to part with

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$500 for a receiver, providing it includes AM, FM and a phonograph. Present prices for such receivers range from $800 to $2500.

On the other hand, 47.8% of the dealers thought that console prices should be from $500 to $750, with the latter for an all-purpose receiver. Regarding table models, the type most frequently sold, 50% thought they should be ticketed from $200 to $300, instead of $250 to $400 as at present.

Video Set Sales Resistance

Among the hurdles in selling tele receivers today, concludes the *Televiser* survey, are:

1. Refusal of apartment house owners to permit antenna installation: 15.7%.
2. Price of installation: 13.4%.
3. Inadequate and too few programs: 13.4%.
4. Lack of daytime programs: 11.9%.
5. Uncertain delivery date: 11.2%.
6. High price of receivers: 9.7%.
7. Small size of screens: 6.0%.
8. Miscellaneous: 8.7%, including uncertainty of set delivery, future price cuts, lack of set selection, fear of early obsolescence, color, clarity of reception, demand for short-term credit.

A major sales hurdle is the lack of daytime programs. 26.1% of the dealers suggested programs continuously from 10 a.m. to 10 p.m.; while 39.5% favored programs from 10 a.m. to noon, and from 2 p.m. to 5 p.m. Still, 33.6% approved programming from 1 p.m. to 6 p.m., while less than 1% favor evening program scheduling as at present.

Anent the present practice of the manufacturer installing and servicing receivers, 44% were in favor, 35% were against, and 21% were undecided. Most dealers (57.5%) said that purchasers were attracted primarily by tele's sports offerings—the baseball games, for example.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933, Of INTERNATIONAL PROJECTIONIST, published monthly at New York, N. Y., for October 1, 1947.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared R. A. Entracht, who, having been duly sworn according to law, deposes and says that she is the Business Manager of INTERNATIONAL PROJECTIONIST and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations printed on the reverse of this form, to wit:

1. That the name and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, International Projectionist Pub. Co., Inc., 19 West 44 Street, New York 18, N. Y.

Editor, Henry B. Sellwood, 19 West 44 Street, New York 18, N. Y.

Managing Editor, None.

Business Manager, R. A. Entracht, 19 West 44 Street, New York 18, N. Y.

2. That the owner is:

International Projectionist Pub. Co., Inc., 19 West 44 Street New York 18, N. Y.

R. A. Entracht, 19 West 44 Street, New York 18, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bonafide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

R. A. Entracht, Business Manager

Sworn to and subscribed before me this 25th day of September, 1947.

(Seal) BERNARD SCHWARZ

Notary Public, New York County Clerk's No. 19.

New York County Registrar's No. 196-S-9.

My commission expires March 30, 1949.

Par's Theatre Tele Audience Test a Press Pipe Dream

Trade press reports that Paramount has already experimented with theatre television by means of sneak screenings in theatres of various video broadcasts (the reports specifically mentioned the recent World Series baseball games) have been found by IP to be without any basis in fact.

True, the New York Paramount Theatre is now fully equipped for just such an enterprise, the tele unit there comprising a camera which scans the cathode tube of a tele receiver and, by means of an ingenious film printing device, permits the development within one minute of a film record which is fed directly into the projector. This equipment has been tested experimentally, but the tests have never been conducted when an audience was in the theatre.

It is belived that the aforementioned press reports were inspired by the recent statement by Paul A. Raibourn, head of Par's tele activities, that such procedure was entirely feasible and would be undertaken within the next few months. IP is able to state authoritatively, however, that no paying audience has yet been privileged to witness such a demonstration.

MONTHLY CHAT

(*Continued from page* 3)

ous activity of trying to "protect" the motion picture industry's stake in the television field. IP now and for some time past has been calling for a definition of terms, pending a rational appraisal of the situation, anent just what is meant by the phrase "motion picture industry".

IP's chief concern, and that of those whom it serves, lies in the exhibition, the theatre, field. Theatres surely constitute an important branch of the motion picture industry; but neither the S.M.P.E. or any other organization or individual, in our opinion, has yet advanced a single material fact tending to show how television will benefit the *theatre* field.

All the evidence at hand indicates that only certain segments of the film industry will benefit by television, as follows: the film stock manufacturers, since video is developing a voracious appetite for film; producers, who have vast studio facilities ardently desired by the television industry; manufacturers of carbons and other light sources, of arc lamps, of laboratory equipment and of various assorted mechanical sundries.

But just where does this leave the theatre field? Precisely nowhere, as we see it. And even should we witness the development of chains of video theatres it is certain that it will be on a scale related only infinitesimally to the present extensive film theatre setup.

Much ballyhoo has attended the lush television program arranged for the forthcoming S.M.P.E. Convention in New York City, with the schedule calling for various video sessions featuring many papers on and actual demonstrations of both theatre and home video. One such session will be in the nature of an open forum at which various prominent motion picture theatre projection people have been invited to exchange views with the tele protagonists.

We trust that this particular session will see brought into the open the various unfavorable comments anent theatre tele that have been circulating in projection circles for many months now. And we are not the least bit interested in that point of view which holds that the physical structure of existing film theatres precludes the effective use of tele equipment. What IP's representative will be on the alert to hear will be the pro and con about television as an art form, as entertainment, with due attention being paid to means for overcoming the enormously difficult task of interpolating spot tele events in a regular film theatre program.

Until the television adherents come up with the answers to the questions posed herein, and several others that require a thorough airing, IP will remain unconvinced that television is other than a menace to the economic welfare of the film *exhibition* field.



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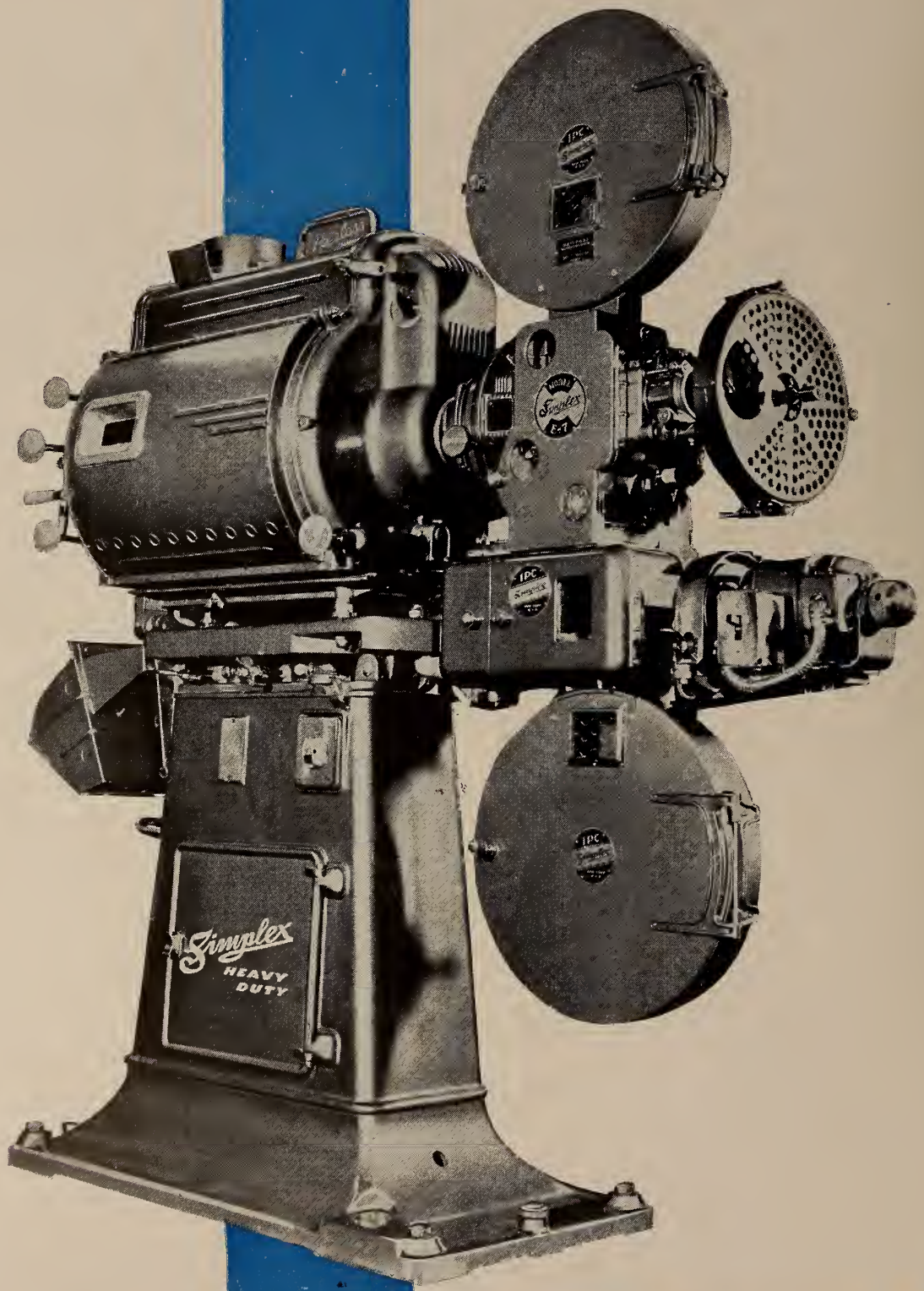
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HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

NOTHING adduced at the recent convention of the Society of Motion Picture Engineers in New York City, either in the form of papers or demonstrations at the technical sessions or through the medium of the equipment exhibit, served to convince this observer of either the imminency or the ultimate practicability of theatre television.

This is not to imply that the tele adherents did not put on a good show; indeed, the video program was easily the standout feature of the meeting, and it was obvious that neither time, effort or expense was spared to the end that video might put its best foot forward.

But despite this obviously tremendous effort to effect a marriage of video and the motion picture, it was all too apparent that the units displayed and the techniques described, far from proving a boon to the film theatre, actually were sharply pointed to favor improved and more economical operation for what we consider to be the theatre's most potent competitor—the tele station broadcasting directly to the home.

True, RCA once again demonstrated its large-screen (48 square feet) tele system, the while it announced that final tests were now underway on a giant 18 x 24 foot system; and Dr. A. N. Goldsmith divested himself of a prodigiously inclusive and what might well come to be regarded as a classic general analysis of theatre television.

But at no time and by nobody during the program was there forthcoming the answers to the two questions which have long since disturbed this corner:

1. If home tele is to be the great success which its phenomenal growth recently indicates it will be, why should Joe Doakes leave the comfort of his home to witness a television program at the Gem Theatre on the corner?

2. Will the tele theatre as envisioned by its proponents offer a motion picture program, as at present, interspersed with spot tele clips? Or will it offer a straight tele program as broadcast by means of national or urban syndication, much in the fashion of present-day radio programs?

Replying to Question 1, Dr. Goldsmith again cited the natural bent of humans toward gregariousness as a means for rooting people out of their homes to congregate with other people. Of course, on this point the Doctor said nothing about the assertions of tele promoters that 25 people will be able easily to view a program as broadcast over a "modern" home set. An audience of such size should go far toward satisfying that gregarious instinct.

On Question 2, the Doctor said that "the answer was very simple" for the reason that the programs entering the home and those directed to the tele the-

(*Continued on page* 38)

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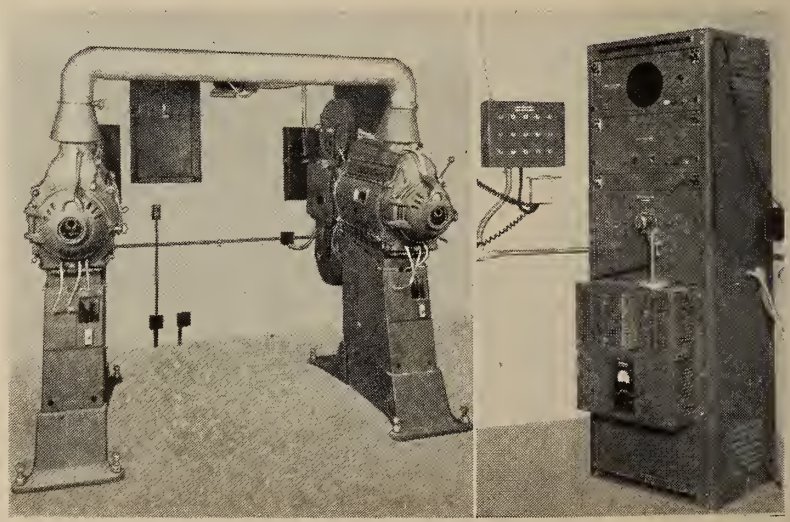


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VOLUME XXII NOVEMBER 1947 NUMBER 11

COLOR TEMPERATURE: Origin and Meaning

By W. W. LOZIER

National Carbon Company, Inc.

ALL of us are familiar with the fact that material substances become luminous when heated to sufficiently high temperatures. The glowing coals in a furnace, the heater element of an electric toaster and the filament of an incandescent lamp are everyday examples. As such a body becomes hotter and hotter, its color progresses from a dull red at low temperatures to a brilliant white at higher temperatures. Common observation of this fact results in a natural association of the temperature of the heated body with the color of the light given off by it.

We know the dull red glow of the electric toaster element symbolizes a cooler temperature than the yellow-white color of the incandescent lamp. It was a natural step to attempt to associate temperatures and colors of heated bodies quantitatively and to describe the color of the light by the temperature necessary to produce it.

Variations in Color

Unfortunately, all substances do not radiate the same color or intensity of light at the same temperature. Just as common objects show a varied color appearance at room temperature, they likewise will show characteristic differences at high temperatures. Bodies which appear red, green, blue or some other color at ordinary temperatures will also show distinctive differences in the various colors when they are heated.

However, scientists have learned there is one type of body which behaves in a precise unvarying manner and which has an exact correlation between color and temperature. This is the so-called "black body." By definition, a "black body" has the property of absorbing all the ultra-violet, visible and infra-red radiation which falls upon it. Therefore, when such a body is illuminated at room temperature by any external light source it will appear perfectly black. The simplicity of its behavior to incident light suggests an equally precise behavior as a light source when a black body is heated to incandescence. Such is indeed the case, and scientists have devised mathematical equations completely specifying the radiant energy emitted by a black body at any temperature.

Most actual substances differ from the "black body" because they reflect some portion of the radiation which falls on them and hence, do not absorb it all. However, the behavior of a black body can be duplicated by a small opening in a uniformly heated enclosure of any material. If the opening is made small enough, the cavity will absorb all incident radiation through multiple reflections inside the body and the radiation issuing from it will be typical of a black body. For example, the radiation from a small hole in an enclosure made of carbon, metal, ceramic or any other material will approximate black body radiation at any temperature which the material will withstand.

Color Temperature Defined

The temperature of a black body is sufficient to define all aspects of its radiation, including the color. In this way, a series of definite colors can be specified ranging all the way from a very deep red to a very brilliant white, each associated with a black body at a particular temperature.

On account of the precise nature of this color scale, it is convenient to specify the color of other types of light sources in terms of the black body color temperature scale. The term "color temperature" used for this purpose means that the light source so specified has a color quality most nearly matched by the color of a black body at the temperature stated.

Color temperature can be ascribed only to those light sources having a color close to that of a black body. In passing along the color temperature range from a deep red to a brilliant white, a black body assumes only a very small fraction of all the colors possible in nature. As a conse-

TABLE I

Color Temperatures of Various Light Sources

Source	COLOR TEMPERATURE Absolute	Fahrenheit
Hot Body at Lowest Temperature Producing Incandescence	800	980
100-Watt Tungsten Lamp	2865	4700
Standard 1000-Watt Tungsten Projection Lamp	3250	5390
Low Intensity Carbon Arc*	3550	5930
"Pearlex" High Intensity Carbon Arc*	4600	7820
Average Sunlight	5090	8700
Other High Intensity Carbon Arcs*	5250-6400	8990-11,060
Average Daylight	6500	11,240

* Crater Radiation only from bare arc.

quence, the colors of many light sources differ so greatly from that of a black body at any temperature that the term color temperature is of no use whatever in describing the color of such a source.

Familiar examples are the sodium lamp and the mercury vapor lamp, the characteristic hues of which cannot be duplicated by black body temperature radiation. Carbon arc and incandescent tungsten colors are similar enough to those from black bodies to permit them to be described by their color temperature.

Because other methods of color specification are usually much more complex, the black body color temperature scale has found rather wide use in spite of its limitations.

It should also be pointed out that color temperature in many cases is ascribed to a beam of light which may be considerably separated from its source in distance and may even be altered in color. For example, it is customary to speak of the color temperature of sunlight even though its color has been modified in coming through the earth's atmosphere.

Methods of Measurement

There are two generally accepted methods of determination of color temperature of a light source. One method involves matching the intensity and color of the light source under study with that of a comparison standard. This comparison standard frequently is an incandescent lamp, the color temperature of which is regulated by varying the electric current passing through the filament. Obviously direct use of this latter method is limited to colors which can be produced by temperatures below the melting point of the incandescent filament.

The second method depends upon the spectroscopic measurement of the amount of energy of each color present in the light source, *i.e.*, a determination of the spectral energy distribution curve. This is followed by a calculation which correlates these data with the average behavior of the human eye and results in the color temperature value for the light source. All of the color temperature values for carbon arcs quoted in this article have been obtained by this latter method.

Various Light Sources

Table I shows the color temperature of familiar artificial and natural light sources. Color temperatures are designated on both the familiar Fahrenheit basis and also on the Absolute or Kelvin (°K) scale more widely used in scientific work. Bodies begin to be luminous at about 800°K (980°F.). The common 100-watt incandescent tungsten lamp for general lighting is stated to have a color temperature of 2865°K (4700°F.). The standard 1000-watt tungsten projection lamp has a quoted color temperature of approximately 3250°K (5390°F.). The low intensity carbon arc with a color temperature of about 3550°K (5930°F.) is significantly whiter than the tungsten sources, as is well recognized in picture projection applications.

Next in order is the "Pearlex" carbon arc used for projection of 16-mm film which has a color temperature of 4600°K (7820°F.). Sunlight, daylight and high intensity carbon arcs falling in the 5000-6500°K (8540-11,240°F.) range represent what are generally considered as white light sources. Light sources with color temperatures much higher than this appear distinctly blue. The blue of the sky may have a color temperature of the order of 25,000°K (44,540°F.).

Color Temperatures of Screen Light

A number of typical carbon arc motion picture projection systems have been evaluated in terms of the color temperature of the light on the projection screen. These are represented in Table II. These measurements include the effect of the optical system in altering the color of the bare arc. The low intensity carbon arc gives a screen-color temperature of 3870°K (6500°F.). The "Pearlex" carbon arc provides screen light with a color temperature of 4450°K (7550°F.) suitable for projection of 16-mm color film. All of the other high intensity carbon arc systems shown have color temperatures between 5020-5420°K (8575-9300°F.) within the sunlight-daylight range. These values demonstrate the well known fact that these high intensity carbon arcs give a color closely resembling daylight, much whiter than the low intensity arc.

In many cases, the true operating temperatures and the color temperatures of substances are not far different. For example, there is research evidence available indicating that the luminescent gases near the floor of the positive crater of high intensity carbons are at a true temperature in the same range as their color temperature of 5000-6500°K (8540-11,240°F.). The energy to maintain this

TABLE II

Color Temperatures of Light on Projection Screen with Various Carbon Arc Projection Systems

Lamp	Carbon Trim	Amperes	COLOR TEMPERATURE Absolute	Fahrenheit
Low Intensity Lamp	12-mm–8-mm Low Intensity	30	3870	6500
Lamp for "Pearlex" Trim	6-mm–5.5-mm "Pearlex"	30	4450	7550
"One Kilowatt" d-c Lamp	7-mm "Suprex" Positive–			
	6-mm "Orotip" C Negative	40	5300	9080
"One Kilowatt" a-c Lamp	7-mm–7-mm "Suprex" Positives	52	5260	9010
		65	5420	9300
Simplified H.I. Lamp	7-mm "Suprex" Positive–	42	5020	8580
	6-mm "Orotip" C Negative	50	5060	8650
Simplified H.I. Lamp	8-mm "Suprex" Positive–	65	5340	9160
	7-mm "Orotip" C Negative	70	5270	9030

high temperature is supplied by the electrical power expended in the arc.

Under the influence of the electrical voltage applied to the carbon electrodes, electrons are accelerated to very high velocities which cause them to strike, like bullets, the rare earth atoms volatilized from the core. The rare earth atoms absorb energy from the bombarding electrons and later radiate it as light of various colors.

It is a characteristic of the rare earth materials used in the high intensity carbon that they can radiate light of many colors throughout the visible spectrum, resulting in radiation very similar to that from a black body. Therein lies part of the explanation for the whiteness as well as the brightness of the high intensity carbon arc.

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SMPE Convention Highlights Television

WITH attendance at an all-time high, the Society of Motion Picture Engineers met in New York last month at their 62nd semi-annual convention. With total registration over 900, the television session attracter over 200 delegates, the largest attendance at any one clinic.

Intense interest was created by RCA's theatre and auditorium television systems, demonstrated for the first time in New York. Ralph V. Little, Jr. and Dr. I. G. Maloff of RCA Victor presented discussion of the techniques involved and an actual demonstration of a 6 x 8 foot projector, using a 21-inch RCA-Schmidt spherical mirror and a 14-inch aspherical correcting lens. Picking up the regular NBC broadcast from WNBT, the projector caused favorable comment in comparison with the prewar 9 x 12 and 15 x 20 foot image systems.

The installation demonstrated, it was disclosed, was small in comparison to the giant 18 x 24 foot system, now undergoing final test at RCA. This system employs a 15-inch cathode-ray picture tube operating at 80 kilovolts, a 42-inch spherical mirror and a 36-inch correcting lens; the largest adaptation of the Schmidt system in the world, with the exception of the 72-inch Mt. Wilson telescope, not yet in operation. The reflective optical system for this huge projector has already been completed and successfully tested and the complete installation will be ready for demonstration, probably within the next several weeks; the time and location to be announced soon.

Wartime and postwar improvements in the electron gun, cathode ray tubes, circuits and improved adaptations of the optical system are reason for the tremendous strides in video during the past few years, resulting in more brilliant image and higher resolution.

Television Committee Report

Paul J. Larson, Chairman of the SMPE Committee on Television, reported on transactions of the Society in the interests of promoting television and told of briefs filed with the FCC. Outlining the Society's activities to promote theatre television, Mr. Larson said that his committee had asked the MPA to set up a producer-distributor-exhibitor committee to work with the engineers, urging cooperation of all companies involved, in the interests of standardization.

Warner Brothers in California and 20th Century-Fox in New York are already experimenting with the 21-inch systems, he said. Larson further predicted that there would be two distinct types of television: programs broadcast directly to homes and programs transmitted directly to theatre television screens.

Plans for the daily operation of a test theatre television system in London and its suburbs during 1948 were revealed by Capt. A. G. D. West, director of Cinema-Television, Ltd. Proving the practicality of the project, he stated that the system will be established for invited and paying audiences, with programs originating in three widely separated studios. Leading theatres have been the subject of much study with an eye toward conversion, and several Gaumont and Odeon houses have been chosen for the test. Commenting on regulatory legislation, Capt. West revealed that it is as much a problem in England as it is in the United States. He cited one regulation to the effect that the theatre television projector ". . . must be completely enclosed with 14-inch brick walls without any doors." Again pointing to control legislation, he mentioned that the Post Office has legal jurisdiction over *all* communications in England and that it is technically illegal to whistle for a taxi ". . . without their permission."

A new 16-mm motion picture camera for recording television programs on film was announced by Eastman Kodak Co. First of its kind, the camera produces motion pictures directly from the face of the monitoring cathode ray tube in a telecasting station. Sound recording being



Newly elected national officers of the SMPE. Left to right: John A. Maurer (J. A. Maurer, Inc.), engineering vice-president; James Frank, Jr., (National Theatre Supply Co.), financial vice-president; and Ralph B. Austrian, (Foote, Cone and Belding) treasurer.



Loren L. Ryder (extreme left) president of the SMPE, presents the Society's highest honors for technical achievements during the past year to John A. Maurer, J. A. Maurer, Inc.; Dr. John G. Frayne, ERPI Division of Western Electric Co.; and Dr. Albert Rose, RCA Laboratories. Mr. Maurer became the first recipient of the newly established Samuel L. Warner Memorial Award for his work in the development of 16-mm sound recording. Dr. Frayne received the Society's 1947 Progress Medal for originating and developing outstanding improvements in sound recording, while Dr. Rose was given the SMPE Journal Award, an illuminated scroll, for his paper "A Unified Approach to the Performance of Photographic Film, Television Pick-up Tubes, and the Human Eye." The presentations were made at the Society's 62nd semi-annual banquet held last month at the Hotel Pennsylvania, New York City.



Edward and Thamas La Vezzi of La Vezzi Machine Works, Chicago, Ill., explain ta Jake Mitchell (center) the finer points af ane af their products an display at the SMPE convention.

done separately by standard methods, the photos are taken at a rate of 24 frames per second. The camera was developed in cooperation with Stations WNBT (NBC) and WABD (Dumont).

Although television was the keynote of the SMPE convention, much attention was paid to motion picture techniques, generally. Hari S. Dasgupta, of Calcutta, India, revealed plans for the establishment of a large production studio in Calcutta and the eventual establishment of a chain of 16-mm open-air theatres extending throughout India. Speaking on the last day of the convention, Mr. Dasgupta said that he had been studying with director Irving Pichel in Hollywood for the past year and will return to India, undertaking to interest the new Indian government in his plan.

Proof of the tremendous need for motion picture theatres in India was evidenced by his statement that there are only about 2000 theatres there, serving a population of more than 400 million. "Open-air theatres, pedestrian versions of your drive-ins, are the logical solution to India's problem," Dasgupta concluded, "since the climate is favorable and this type construction offers savings in time and capital."

Wide Drive-In Expansion

How the American drive-in theatre grew from a depression-inspired brainstorm to a fast-growing family institution, was outlined in a talk by S. Herbert Taylor, professional engineer of Park-In Theatres, Inc. The drive-in, he said, has extended the influence and benefits of motion pictures to a large group who previously couldn't or didn't want to attend movies, including invalids, chronic stay-at-homes and parents who can't find baby-sitters.

Explaining the origin of the drive-in, Mr. Taylor stated that it was conceived during depression years when the inventor decided that the two things most people would refrain from last were automobiles and movies. Thus, he combined them to establish the drive-in, which has passed its experimental stage and is now a permanent part of the theatre industry.



Upper Photograph—RCA is strongly represented in this group caught by IP's alert cameraman just after the close of one af the many technical sessions at the recent SMPE meeting. *Left to right:* Marty Bennett, Russell Little, Jack O'Brien, and C. E. Johnson, RCA; J. C. Skinner, Interstate Circuit (Texas); Ed Auger and Ed Stanko, RCA. Lawer Photagraph—*Left ta right:* Herbert Griffin, Librascope, Inc., Burbank, Calif.; Thad Barrows, Local 182, Baston, Mass.; Jack Sawyer, L. 233, Buffalo, N. Y.; Cecil R. Wood, Sr., Lacal 306, New York, and P. A. McGuire, Internatianal Projectar Corp.

Kodak Discloses Sub Periscope Camera

Information about a new type of periscope camera for the U. S. Naval submarine service, has been revealed by Eastman Kodak. The new camera can snap closeup beachhead photos at a rate of better than one per second. Kodak also reported that it has supplied the Navy's undersea force with a device by which a sheet of film from the new camera can be processed in daylight in less than 60 seconds.

Early in the war. Kodak converted two standard Eastman cameras for submarine periscope photography. One was a 35-mm Kodak for still pictures and the other was a 16-mm unit for periscope movies. Both types could be clipped over the periscope eyepiece and were widely used in combat to record torpedo hits, sinkings and on scouting missions.

The new camera, affording low-angle assault-troop views was made primarily for reconnaissance work. Photos are about four inches square and can be pieced together to form a shoreline mosaic. This method often proves more suitable for invasion planning than does the use of aerial photography.

Special Type Film

The rapid method of film development is possible when single-exposure film sheets are used. The film is in a special case and when removed from the camera after exposure, is dipped into fast developing, washing and fixing solutions. The resulting negative is immediately available for study, even before printing. Generally though, the camera uses aerial film in 20-foot lengths, which permits 50 exposures, but requires standard development time.

The camera is equipped with an f6.3 Kodak Ektar lens, focused at infinity. Focal length is 127-mm and shutter speeds range up to 1/200th of a second. Exceedingly compact, the installation weighs only 19½ pounds, measures 10 inches on a side and is moisture-tight for submarine installation.

RCA Permits Service Policy Renewal

RCA Victor has announced extension of its Television Owner's Policy, thus providing service, maintenance and parts replacement coverage after the expiration of the first year at a reduced fee.

Taken to meet requests from RCA Victor set owners, this step is an innovation in the radio-television industry. The original policy provided for the supply of antenna, installation of antenna and receiver, maintenance, service and parts replacement for one year. Contracts for the renewal policy will be made available to set owners by the RCA Service Company through direct mail and personal contact.


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THE PRODUCTION OF CARTOON FILMS

By DAVID HAND
G-B Animation, Ltd.

This article, which was read at a meeting of the British Kinematograph Society, deals with the development of a cartoon sequence from the original story idea, through production routine, to its inclusion in a finished film. The production steps in a Walt Disney cartoon were outlined in a previous issue of I. P., and a comparison of the methods employed by American and British animators should prove highly interesting.*

NO SCRIPT is prepared for a cartoon film. The script is always in graphic form — many drawings which describe the action are arranged in sequence and continually revised until the complete idea is finally approved for production. As an average, an individual drawing corresponds to about eight feet of film, although sometimes it may be necessary to draw half-a-dozen pictures for ten feet of film, while on the other hand, a single picture may sometimes cover 20 or 30 ft.

Each story board consists of about 60 drawings, and a complete cartoon might comprise three or four boards. The usual method of developing a story is to assign a basic idea to two artists, who stimulate each other in developing their "gags," until a single sequence is eventually completed. When the whole story is finally approved, it is handed to the director. He is the co-ordinator of all the departments, and is responsible from the inception of the story until the picture is finally screened.

Musical Sequence

Before the story goes to the director it may be pre-scored. Dialogue must always be pre-scored, and in this case a chart is prepared for the director, which shows frame by frame timing of vowels, consonants, inflections, and modulations of the voice. Music need not be pre-scored, and it is possible to complete a picture without any music having been composed, thanks to the mechanical means used for timing and synchronizing the music. A musical production, which must synchronize with the cartoon action, that is, dancing, should be pre-scored.

The director must at that time decide the tempo of the picture. The setting of the tempo is done by an understanding of music and treatment. The music beat must fit the picture tempo, whether it be, say, two beats to the second (known as "two twelves," since there are 24 frames to the second), three to a second, with a beat every eight frames, or otherwise. Generally, a picture will start in slow tempo and increase speed towards the end.

Having decided the tempo, the director times every foot of action throughout the film. He has for this purpose a work-sheet: a chart into which is written a description of the action for each foot of film. The chart is divided into squares, which in the case of 2/12 timing, will each represent twelve frames. Each square is numbered, and these numbers are given to the composer of the music, who numbers each bar of music to correspond.

Next, the director makes out an exposure sheet, which is the "bible" for the animator and everybody else concerned with the picture. On this are lines which allow for the indicating of the individual drawings; each line represents 1/24th second, or one frame of film. Columns show the "cell level"— the position of a particular celluloid in photographing. On this chart, each drawing is numbered, and in exposure the camera operator places the drawings where the animator has numbered them. Drawings are registered on all drawing-boards and on the camera by means of holes fitting on standard pegs.

Layout Technique

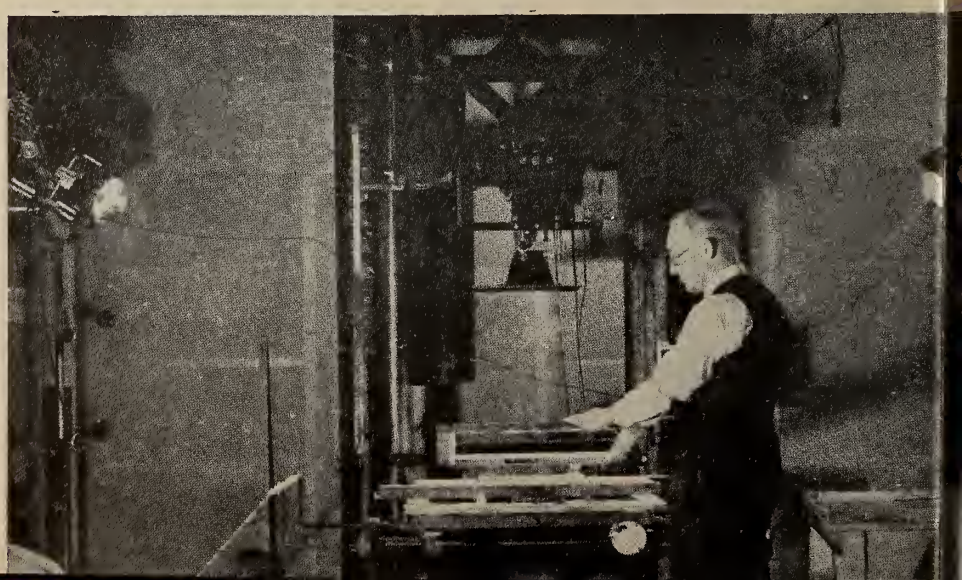
The layout man starts with thumb-nail sketches, which he subsequently draws to full size. Consecutive layout action sketches will show the positions of the characters in various portions of the scene. The normal "field" of the camera is 10" x 7¼"; while shooting, the camera may be moved closer to the drawing, so restricting the area of the "field."

The director delivers the layout and exposure sheet to the animator, who will create the movements of the characters. The length of time which it would take a single animator to produce a complete film would be too long, and so a group of animators must be employed. One director can supply one or two layout men and about five animators, and this, therefore, is the basis for the total number of artists in a production unit.

These five animators would tend to produce five different types of characters. To prevent this, model sheets are prepared, showing a character in various positions, and showing also the exact relation of the head and body, the placement of the eyes, and other features. The great art of the animator is not simply to be able to draw the character correctly, nor even to be able to make him move, but to make him *live*.

The animator makes the extreme drawings of the action, and his assistant and

The Animation Camera



* "Production Steps in a Walt Disney Cartoon," by William Hosie, IP for July 1946, Sec. II.





When "the dawn comes up like thunder"...

HE'S at his console—the re-recording mixer—weaving skeins of sound into the picture's pattern . . . skillfully matching sound to sight, mood for mood.

Under his sensitive control, dialogue and music and special effects are expertly proportioned, delicately balanced to round out the realism and drama of the scene.

To fulfill this essential contribution to the picture, the re-recording mixer requires creative understanding of the director's desires . . . a sense of the dramatic . . . a feeling for mood . . . and the high order of faithful sound reproduction and re-recording he gets from the large and versatile family of Eastman motion picture films.

EASTMAN KODAK COMPANY

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FORT LEE • CHICAGO • HOLLYWOOD

Projection Data Charts

By ROBERT ALLEN MITCHELL

VII. Projection Room Accessories Data

THIS is the last in a series of seven articles in which data forms are provided for the convenience of the projectionist in recording information pertinent to his equipment. When filled out to a reasonable degree of completeness, they furnish a comprehensive and accurate description of the individual installation.

Form 7 includes data on those items of the projection room equipment and stage apparatus controlled from the projection room not given in previous data forms. Fill out the form in pencil, not in ink. Changes may be desired later. Enter the most obvious and easily determined facts first, then attend to the details.

No special instruction is necessary apropos the data required on this form. The remark may be made, however, that the most satisfactory focal length for the stereopticon lens is approximately 3¼ times the E. F. (equivalent focal length) of the film projection lens. This provides close matching on the screen when slides having a 2".75 x 2".00 mat opening are used. The E. F. of the stereo lenses is required in section 3 of this form.

DATA CHARTS ON PAGES 14-15

"in-betweeners" make the breakdown drawings. Each animator makes an average of one in five of the key drawings. For each key drawing the animator makes a chart showing the spacing between successive drawings.

Animation

At this stage, the individual drawings are filmed and projected as a test. The negative itself is projected, often in the form of a loop. The animator may revise his animation as many as five or six times before the scene is finally approved by the director. Another type of animator is the effects animator, who makes splashes of water, puffs of smoke, and similar effects.

When the test film has been finally approved, the drawings are passed to the inking and painting departments, first passing through a checking department to be sure that the drawings are in proper level (a drawing must be kept at a constant celluloid level, to avoid changes in color saturation). The color of the character must be decided; the coloring must for instance, be changed between sunlight and moonlight.

Pre-Camera Work

The girls in the inking department trace the drawings upon transparent celluloid sheets, .005 in. thick. The background is, of course, drawn only once, and the only opaque section of the celluloid is the character. After the background has been rendered and the celluloids have been inked and painted, the complete set moves into the camera department.

Although the drawings are to be photographed in Technicolor, a single-film camera with appropriate color filters is used; three frames are exposed on each drawing. Light is provided by spotlights; a glass frame holds the celluloids flat against the background.

Sound Sequence

Sound sequences must be recorded, checked, and approved, and for this the director is responsible. When the picture tests are completed, the dialogue track is run with the test. At this stage the director calls in the musician; he sees the test reel and he has the work sheets describing the action. He makes a rough composition for the picture, always in the tempo that has been decided upon. A piano track may be made and run in synchronism. Eventually, the score is approved, and is then orchestrated. In recording the final track, the conductor wears earphones on which he hears the pre-determined beat, thus assuring perfect synchronism between picture and sound.

The process of dubbing requires great care. There are the dialogue track, vocal track, two or three effects tracks, and often two music tracks—an average of five or six tracks, all of which must be properly balanced. The picture may be run twelve or fifteen times bfore the track is recorded, each time with a slightly different balance of the component tracks.

Progress of an individual drawing. Left, lay-out sketch; center, drawing ready for film test; right, drawing inked in and painted.



Discussion

A Visitor: Can Mr. Hand describe the Disney Multiplane camera?

The Author: The Disney Multiplane camera is about 18 or 20 ft. high; between the camera and the background plane are several planes, each capable of moving individually. Each plane consists of a plate-glass with registering pegs, and its own lighting system.

Mr. F. Rodker: How are special effects, such as water and rain produced?

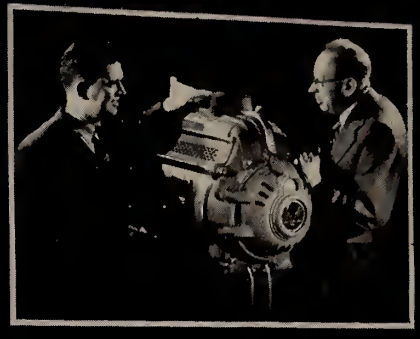
The Author: Water effects can be created in two ways: either by orthodox animation, or the character to be reflected can be photographed in a mirror through a distorting glass. Rain is usually produced by superimposing "live action" on the scene, although it may actually be animated.

Mr. Wills: How is the effect produced of living persons moving among cartoon characters?

The Author: There are two methods of combining cartoon characters with live actors. In one system, the cartoon may be made first, and the live actors added by projecting the cartoon as a back-projection shot while the actors are photographed in the foreground. A more complicated method is the double-printing process: the animator takes a rough tracing of the previously photographed live actor's action, and then animates his drawings to fit in with the live action: the finished films are then double-printed through appropriate mattes.

REGARDLESS OF THE SIZE OF YOUR SCREEN YOU CAN HAVE REALLY BRILLIANT PICTURES!





The 1947 Model STRONG MOGUL
—The Ideal Projection Arc Lamp for Drive-Ins and Large Theatres

projects 15,000 lumens of light—the maximum film will accept without damage—at the lowest possible cost.

Utilizing all the advantages of 70 ampere, 40 volt burning of Suprex carbons, this Mogul projects a brilliant picture on 48-foot and larger screens with all details clearly visible 500 feet or more back from the screen.

It is impractical to use more than 15,000 lumens as it would damage the film and no advantage is gained by the use of contraptions for cooling the gate, or glass heat filters, for they absorb practically as much light as they do heat, in addition to being too expensive and complicated for typical theatre applications.

It is furthermore wasteful, as well as futile, to burn more than 70 amperes in any reflector lamp, or twice the current in condenser lamps.

NOW—MORE THAN EVER,

When the lamps are **STRONG** *the picture is bright!*

THE STRONG ELECTRIC CORP.

87 City Park Ave., Toledo 2, Ohio

The World's Largest Manufacturer of Projection Arc Lamps

USE THIS COUPON FOR A FREE DEMONSTRATION OR LITERATURE

THE STRONG ELECTRIC CORP.,
87 City Park Ave., Toledo 2, Ohio.

( ) I would like to have a demonstration of the 1947 Model Mogul Projection Arc Lamp in my theatre, without cost or obligation.

( ) Please send free literature on the 1947 Model Mogul Projection Arc Lamp.

Name .....

Theatre .....

Street .....

City & State .....

FORM VII: PROJECTION ROOM ACCESSORIES DATA

Theatre _____
City _____
State _____
Theatre Circuit _____

Date _____
Revised _____

Chief Projectionist

1. REWINDERS, SPLICERS, ETC.

Rewinders:
Make & model _____
No. rewinder sets _____
Serial Nos. automatic rewinders _____

Motor- or hand-driven _____

Rewinder motors:
Make & model _____
Serial Nos. _____
H. P. _____
Volts _____
A.C. or D.C. _____
Cycles & Phase _____
Speed _____

Belts & pulleys _____

Speed controls _____

Automatic shut-offs _____

Film splicers:
Make & model _____
No. splicers _____
Serial Nos. _____
Details _____

Film cleaning machines and waxers:
Make & model _____
Serial Nos. _____
Description _____

Footage counters:
Make & model _____
Serial No. _____
Description _____

Film humidors, camphor boxes, etc.

Projection reels:
1000 ft. reels: No. _____
Type _____
2000 ft. reels: No. _____
Type _____

Remarks _____

2. CABINETS

Film cabinets:
Make _____
No. _____
Compartments per cabinet _____

Disc record cabinets _____

Spare parts cabinets _____

Lockers and other cabinets _____

Remarks _____

3. SPOTLIGHTS & STEREOPTICONS

Spot and effect lights:
Make & model _____

Type light source _____
If mazda, type bulb _____

If arc, size carbons _____

Current, amps _____
Volts _____
A.C. or D.C. _____
Cycles _____
Current source _____

Switches, fuses, etc. _____

Lenses, masks, and iris stops _____

Color slides or wheels _____

Animated effects devices _____

Stereo slide projectors:
Make & model stereopticons. (If attachments for regular film projectors, so state.) _____

No. stereos _____
Serial Nos. _____

E. F. of stereo lenses _____
Slide-carrier aperture _____

Type light source _____
If mazda, type bulbs _____

If arc, size carbons _____

Current, amps. _____
Volts _____
A.C. or D.C. _____
Cycles _____
Current source _____

Switches, fuses, etc. _____

Remarks _____

4. LIGHTS

House lights:
Type _____
Type bulbs or gas tubes _____

No. bulbs or tubes _____
Total wattage _____
Transformers _____

"On-off" switches: Type _____

No. in circuit _____
Location _____
How wired _____

Relays: Make and specifications _____

Location _____
Dimmers: Type _____

Make & model _____
Specifications _____

Fuses or circuit-breakers:
Type _____
Rating _____
Location _____

Footlights (if controlled from projection room):
No. circuits _____
Colors _____

Type bulbs _____
No. bulbs per circuit _____
Total wattage per circuit _____

Switches: Type _____

No. per circuit _____
Location _____
How wired _____

Relays: Make and specifications _____

Where located _____
Dimmers: Type _____
Make & model _____
Specifications _____

Fuses: Type _____
Rating _____
Location _____

Borderlights (if controlled from projection room):
No. circuits _____
Colors _____

Type bulbs _____
No. bulbs per circuit _____
Total wattage per circuit _____

Switches: Type _____

No. per circuit _____
Location _____

How wired _____

Relays: Make and specifications _____

Where located _____
Dimmers: Type _____
Make & model _____
Specifications _____

Fuses: Type _____
Rating _____
Location _____

Remarks _____

5. CURTAINS

Grand drape:
How worked _____
Seconds to open or close _____
Switches: Type _____

No. in circuit _____
Location _____

How wired _____

Relays: Make and specifications _____

Where located _____
Fuses: Type _____
Rating _____
Location _____
Curtain control: Make and model _____

Serial No. _____
Motor: Make and model _____

Serial No. _____
H. P. _____
Volts _____
A.C. or D.C. _____
Cycles & phase _____
Speed _____

Title curtain:
How worked _____
Seconds to open or close _____
Switches: Type _____

No. in circuit _____
Location _____

How wired _____

Relays: Make and specifications _____

Where located _____
Fuses: Type _____
Rating _____
Location _____
Curtain control: Make and model _____

Serial No. _____
Motor: make and model _____

Serial No. _____
H. P. _____
Volts _____
A.C. or D.C. _____
Cycles & phase _____
Speed _____

Remarks _____

6. COMMUNICATIONS

Telephones:
No. regular phones _____
No. intertheatre phones _____
1-way or 2-way _____
Connected to what points of theatre _____

Buzzers and annunciators:
No. and description _____

1-way or 2-way _____
Purpose (explain signals) _____

Rung from what points in theatre _____

Remarks _____

7. TESTING AND OTHER EQUIPMENT

Testing equipment. (Do not include apparatus owned by the projectionists or service engineers.) _____

Miscellaneous equipment or accessories. (If desired, optical glass, port slides, work-lights, fire extinguishers, etc., may be included.) _____

Light Generation by H. I. Carbon Arcs†

By F. T. BOWDITCH

Research Laboratories, National Carbon Company, Inc.

The theory of light production in the high-intensity carbon arc is discussed, together with a description of the phenomena associated with the initial striking of the arc and the maintenance of the electric discharge through the arc stream. The formation of the positive carbon crater is described and the factors defined which determine the maximum current loading which a particular carbon electrode will support. The importance of efficient heat dissipation from the positive crater region in extending the useful current range of a given-sized carbon is pointed out, and the effectiveness of water cooling in providing better heat dissipation at this point is noted.

IN THE motion picture industry light is perhaps the most important single factor in the recording and reproducing processes involved. Light is thrown in carefully controlled quantities and distribution patterns on the motion picture sets and on the actors. Reflected portions of this incident energy are directed toward a camera lens, and focused to produce a permanent record of this reflected pattern on film. Finally, light is selectively absorbed by prints from this film in a theatre, so that the distribution pattern reaching the original film in the studio camera may be recreated on the theatre screen. Light is also an essential agent in the recording and reproduction of sound, although that important phase of the industry will not be included in this present consideration.

The high-intensity carbon arc is such a commonplace and generally useful light source in the photographic and projection processes which characterize the motion picture industry[1, 2] that little thought ordinarily is given to the physical processes involved in the operation of such a source. In the belief that concepts found useful in the laboratory in directing the development of new and brighter carbons may be of interest to the ultimate users of such carbons, the present discussion has been prepared.

To begin with, consider the simple arc circuit of Fig. 1. Here a direct-current source of perhaps 110 volts is connected through a series resistor to a pair of carbons. In common with all gaseous discharges, the carbon arc has a negative resistance coefficient: as the current is increased, the ohmic resistance of the arc becomes less. Some ballast effect, such as is provided by the series resistor in this case, must, therefore, be incorporated in the circuit. To start the arc, the two carbon electrodes are brought into brief contact, drawn apart again, and a light source of very high intensity is produced where nothing but air existed before.

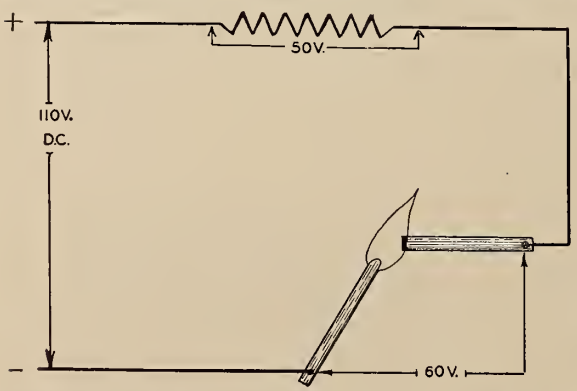


FIGURE 1.

A typical carbon-arc circuit.

When the power is first applied nothing happens, because the circuit includes an air gap between the carbon electrodes which cannot be broken down by the relatively low voltage of the power source. It is not until the electrodes are brought into physical contact that current starts to flow.

Thermionic Emission

In a series circuit, such as is established when the electrodes touch, the same current flows throughout, so that the relative heat in any portion of the circuit is determined by the resistance of that portion. At the point of contact between the electrodes, the cross-sectional area is small, so that the resistance is high. As a result, a high concentration of heat is produced at this point; and as the pressure on the electrodes is reduced, preparatory to separating them, the contact area grows smaller and smaller, so that it continues to become hotter and hotter.

In order to explain what happens next, it is necessary to consider an atomic property of hot bodies called thermionic emission. The atoms in any solid substance are in a continual state of vibration, with electrons revolving rapidly around each nucleus in a variety of orbits at various distances. When the substance is heated, the atomic vibrations grow more intense, and the electrons spin faster and faster through wider and wider orbits.

In the case of those atoms next the surface, an occasional electron will break away altogether, and as the heating continues more and more electrons fly off into space. Hot carbon is not so good an emitter of electrons as the materials used for this purpose in vacuum tubes, but it does possess this property to an appreciable degree.

Thus, to return to the arc, as the last pair of atoms is about to be drawn apart in the separation of the electrodes, the concentration of current and the intensity of the resultant heat are terrific, sufficient not only to cause thermionic emission, but to vaporize the carbon itself at the tiny area of final contact.

Consider also what would happen at the instant of separation if no arc were to form, so that the current would fall abruptly to zero. The full open-circuit line voltage would immediately appear across the gap, and if the initial gap is assumed to be a millionth of an inch, and the line voltage 100 volts, a voltage gradient of 100,000,000 volts per inch would be established promptly.

It naturally follows that such a tremendous voltage gradient, acting in combination with the free electrons around the white-hot electrode tips, causes enough of them to flow across the gap

† *J. Mot. Pict. Eng.*, Sept., 1947, p. 210.

[1] KALB, W. C.: "Progress in Projection Lighting," *J. Soc. Mot. Pict. Eng.*, July, 1940, p. 17.

[2] LINDERMAN, R. G., HANDLEY, C. W., and ROGERS, A.: "Illumination in Motion Picture Production," *J. Soc.. Mot. Pict. Eng.*, June, 1943, p. 333.

as the carbons are pulled apart so that current continues to flow through the hot gases, and an arc is established. In turn, the high concentration of power within the narrow confines of the arc produces light, after the following fashion:

To begin with, there is incandescent carbon at its volatilization temperature of over 6500 F (3600 C). Since a temperature of only 2600-2900 F (1425-1595 C) is enough to produce a "white heat," it is apparent that incandescent carbon alone is responsible for a good share of the brightness of the carbon-arc crater; for all of it, as a matter of fact, in the low-intensity carbon arc, and from a fifth to a half of the total brightness in common high-intensity trims.[3]

The increased brightness of the high-intensity arc is the result of the combination of a high current density, *i. e.*, a high concentration of electrons in the arc stream, and an atmosphere in the positive crater region rich in "flame materials" volatilized from the special coring of the positive electrode. These flame materials are in most cases compounds of the cerium group of rare-earth

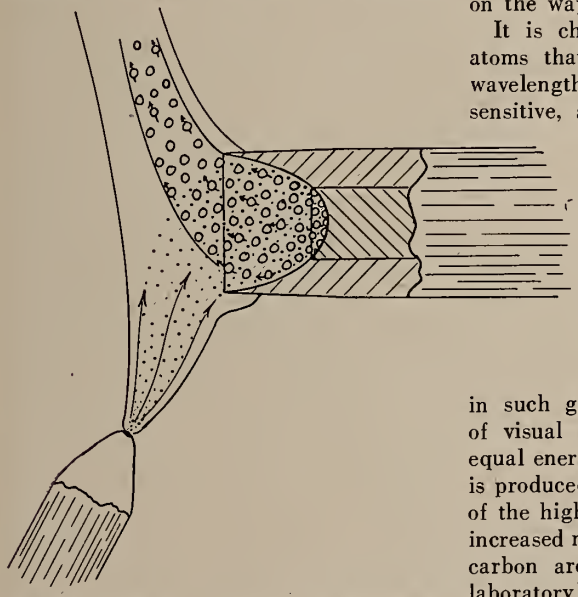


FIGURE 2.

Diagram showing the mixture of rare-earth atoms and electrons in the positive crater of the high-intensity carbon arc.

metals, combined in a mixture with carbon in the core.

Excess Energy Defined

As the carbon shell burns away to form a crater, as indicated by Fig. 2, the core is exposed to the extreme arc temperature and is vaporized into the crater enclosure. Here, the rare-earth particles are bombarded by electrons to produce very intense light.

It is perhaps helpful here to picture a maelstrom in the positive crater, with many billions of rare-earth atoms continually colliding with as many electrons. As the result of each collision, a rare-earth atom absorbs energy from an electron, and is transformed into an "excited" state. In other words, the excited atom possesses an amount of energy in excess of the normal stable value.

Moreover, as defined by quantum theory, this excess energy may have any one of a number of discrete values, depending upon the number and arrangement of the electrons circulating around the atomic nucleus. The rare-earth atoms have many electrons (cerium has 58, circulating in 14 different orbits) so that the likelihood of scoring a hit on such a large, well populated target is correspondingly increased.

At the same time, there are a great many excited states possible, so that the likelihood is excellent that a hit will produce excitation. Since the rare-earth atoms are not stable in these excited states, they immediately give up their excess energy. This they do in the form of pulses of radiation, each having a particular wavelength associated with the excited state; or an excited atom may return to a normal energy level in a series of discrete steps, emitting radiant-energy pulses of as many different wavelengths on the way.

It is characteristic of the rare-earth atoms that these energy pulses are of wavelengths to which the human eye is sensitive, and that they are distributed in such great numbers over the range of visual sensitivity that an essentially equal energy spectrum or a "white" light is produced. In this way, the brightness of the high-intensity carbon-arc crater is increased many-fold over that of the plain carbon arc (to over ten times, in the laboratory).

Fig. 3, which shows a picture of a



FIG. 3. The inclined trim high-intensity carbon arc (13.6-mm positive carbon at 150 amperes with the negative directed upward at an angle of 53 degrees from the horizontal).

typical high-intensity carbon arc, can now be viewed with a new understanding of what is going on.

From the incandescent tip of the negative carbon underneath, countless numbers of electrons are being drawn out into arc stream and accelerated like bullets toward the positive electrode by the voltage gradient along the arc stream. To make enough electrons available, *i. e.*, 63, followed by 17 zeros, electrons per second for each ampere, the negative tip must be heated to a very high temperature, hence the bright tip and red heatback of this electrode.

These electrons rush across the arc stream, meeting nothing much except air atoms until they approach the region of the positive carbon, a bluish light resulting from collisions with the air atoms in the arc stream. At the crater, and particularly inside it, the electron stream encounters the rare-earth atoms, with a resultant production of brilliant white light. Under the influence of convection currents established by the hot



FIG. 4. Comparison of the core sizes and craters of typical low- and high-intensity carbon arcs. (The deep high-intensity crater shown in the upper cross section was formed on a 13.6-mm carbon at 150 amperes, the almost flat low-intensity crater on a 12-mm carbon at 30 amperes.)

[3] MacPherson, H. G.: "A Suggested Clarification of Carbon Arc Terminology as Applied to Motion Picture Industry," *J. Soc. Mot. Pict. Eng.*, Nov., 1941, p. 480.

gases, a bright stream of excited rare-earth atoms emerges from the crater and drifts upward into the tail flame.

Important Properties of Carbon

Carbon is an ideal material from which to construct the electrodes for such an arc because of three important properties: (*a*) it is a good electrical conductor, (*b*) it remains in solid form to a very high temperature (approximately 6500 F (3600 C)), and (*c*) it volatilizes directly without passing through a messy molten state.[4]

The positive electrode of the high-intensity carbon arc differs from that employed with the low-intensity arc in two important respects. The core is not only much larger, but it is also heavily loaded with the flame materials whose light-producing function has just been described.

In low-intensity positive carbons, the core hole is no more than one-fourth the diameter of the shell: in the high-intensity positive carbon, the core is at least one-half and is frequently a much greater proportion of the outside diameter of the shell. This is illustrated by Fig. 4. The current density is also much higher, a one-half inch low-intensity carbon operating at about 35 amperes as compared with well over 100 amperes for the same-sized high-intensity positive carbon.

Because of the lower voltage drop from the arc stream to the core, as compared with the voltage drop to the carbon shell, most of the electrons forming the high current in the arc stream are encouraged to travel to the central core. Here the concentration of energy is so great that the core and the immediately surrounding shell are vaporized faster than the shell at the outside. Thus, as shown by Fig. 4, a cup or crater is formed on the end of the positive carbon, which is filled with the rich light-producing mixture of rare-earth vapors and electrons.

As the current is increased, the depth of this crater likewise increases to a limiting value determined by what is called the "overload" of the carbon. Overload is characterized by the fact that beyond a particular current value the arc no longer burns smoothly and quietly, but becomes unsteady and noisy. Since, for all important uses, the arc must be both stable and quiet, operation is always confined to currents well below this overload value.

Overload Mechanism

As shown in Fig. 5, the mechanism of overload is visualized as follows. Since the electrons encounter a much lower voltage drop in entering the positive carbon through the central core, the resulting crater becomes deeper and deeper with increasing current.

At the same time, the tendency for electrons to flow directly to the shell *C* at the mouth of the crater, instead of taking the longer path to the bottom *B*, becomes greater and greater. Finally, the difference between the voltage drop over the longer arc stream *AB* to the bottom of the crater, and the voltage drop along the shorter path *AC* to the crater lip, becomes sufficient to counteract the effect of the more favorable electron entrance into the core.

When this happens, the electrons travel in increasing numbers to the shell. Here the rate of energy release increases to a point where carbon is volatilized violently and noisily. Thus, an upper limit of about 35 volts (the anode drop to pure carbon) seems to be imposed on the voltage component of the energy which can be released within the positive crater. The current component of this energy is less rigidly limited.

For instance, water-cooled positive jaws

(*Continued on page* 27)

[4] Chaney, N. K., Hamister, V. C., and Glass, S. W.: "Properties of Carbon at the Arc Temperature," *Trans. Amer. Electrochem. Soc.*, 1935, p. 201.

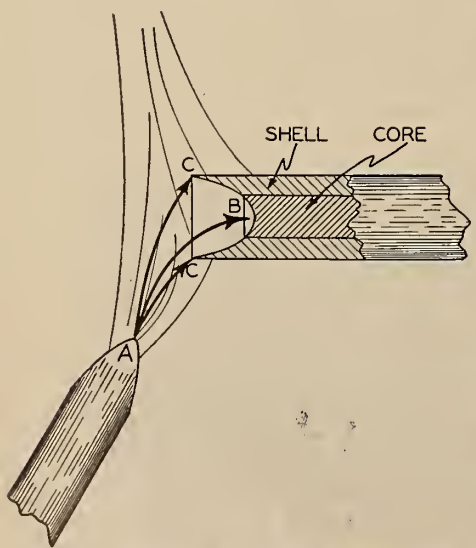


FIG. 5. Diagram illustrating the mechanism of overload in a high-intensity carbon arc. *AB* = normal electron path of core; *AC* = overload electron path to carbon shell.

British Screen Brightness Standards

DIRECT comparison of British and American screen brightness standards is now possible as a result of the promulgation recently of the recommendations of a joint British investigation committee comprised of representatives of exhibitors, technicians, and the Ministry of Education. On the basis of a review in *Ideal Kinema*, it would appear that considerable variance exists in currently accepted British and American practices.

The British figures provide for from 8 to 16 foot-lamberts, compared with the SMPE American standard of 9 to 14 foot-lamberts. Measurement of brightness, it is specified, should be made normal to the center of the screen, with the projector running but with no film in the gate.

Screen brightness measured at a number of London theatres varied over a range of 10 to 1. At the time the committee resumed its work immediately following the war, states the *Ideal Kinema*, it was believed that for a given black-and-white print there would be a minimum brightness below which projection would be unsatisfactory; while at high brightness levels the quality might deteriorate due to film grain or flicker.

Print Density Major Factor

Density of print was acorded major consideration in the British survey, since "a light print will have a lower discrimination of tones in the highlights; while a dark print will result in a lower effective screen brightness, which results in a reduction of tone discrimination due to the eye itself".

Equipment used for the tests included an f1.9 lens, a carbon arc operating at 62 amps., 38 volts, and a non-perforated matt white screen. Use of this type of screen occasioned considerable eyebrow-lifting among American technicians in view of the difficulty of effecting any worth while comparison with the perforated screen used universally.

Experimental conditions were carefully standardized, and the committee summarized its findings under five headings: visibility of grain, appearance of flicker, glare, specific comments on individual subjects, and general quality of projection. The findings were translated into the form of curves, relating respectively to general quality and the visibility of grain and flicker for both color and black-and-white films.

Translating these curves into brightness figures gave the following results, in foot-lamberts:

	Minimum	Maximum
Black-and-white	12	24
Technicolor	7	14

The figures finally specified were decided upon after further consideration of practical factors. It is mentioned that it may prove advantageous to use a denser print and a high screen brightness, but this cannot at the moment be achieved in the majority of theatres.



The brilliant arc between two "National" High Intensity projector carbons is brighter — per unit of area — than the heart of a V-2 rocket blast.

This powerful man-made sunlight is harnessed in your projection booth. It is snow white, perfect for bringing out detail and full rich color on your screen. And yet, compared to other operating costs, the expense of "National" projector carbons is negligible.

When "National" projector carbons are used as the light source, you give your patrons the kind of vivid, easy-to-see pictures they really enjoy. You'll find that "National" projector carbons have a definite effect upon your box office.

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IN THE SPOTLIGHT



By *HARRY SHERMAN*

WE LEARNED recently that the governor of the state of Connecticut is eager to join a labor organization. At the Connecticut Federation of Labor Convention, Governor James L. McConnaughty expressed his desire to hold a union membership card. He explained that as a boy he attended a school which emphasized industrial training, and he became a carenter's apprentice. "But," said the Governor, "there was no union organization in our home town then. My teaching days were before that profession had unions. College presidents have no unions. . . . And governors seem to be left out in the cold, too."

Connecticut IA Local Unions please take notice.

• A note from Gunner K. Roberts, No. 19087767, Ward 54 of the Military Hospital, Chester, England, states that he is most anxious to correspond with IP projectionist readers. Roberts was a projectionist in civilian life and would like to establish contact with fellow workers in this country for an exchange of views on matters of mutual interest.

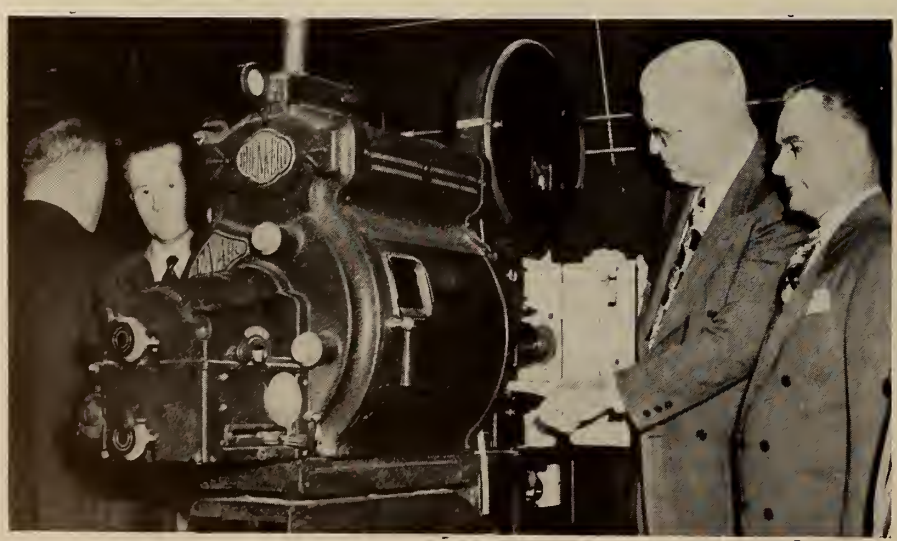
• The IPS (International Projection Society) of Toronto, Canada, has resumed its regular meetings after the long summer lay-off. Sam Bowes, secretary-treasurer of the Society, informed us that the first meeting of the Fall and Winter series had as guest speaker, Mr. Don Spring, of Canadian Kodak Sales, Ltd. Mr. Spring talked on the complicated and exacting processes involved in the production of film, from the raw product to the finished stock. An open forum was held after the lecture in which Mr. Spring was given an opportunity to enlarge upon the subject by answering the many questions put to him by the members. Bowes also advised us that the Society has received requests from many manufacturers and supply houses for permission to demonstrate their products at future meetings.

It looks like IPS is well on the way towards gaining the recognition it deserves.

• Cash dividend payments by film companies during July continued to run far ahead of the 1946 figures, says the U. S. Dept. of Commerce. The figures, according to the Department, account for about 60% of all cash dividends paid.

Total for July this year by picture companies was $4,521,000, compared with only $3,182,000 a year ago. While July payments did not match June payments of $7,967,000, the three-month total for May, June, and July upped to $12,676,000, which is $60,000 better than the preceding quarter and nearly $3,000,000 better than similar '46 period.

• Chicago's Mayor Kennelly appointed Ward Hanagin, a veteran member of Chicago Local 110, to the office of Superintendent of Electricity, at a yearly salary of $8500. This appointment places Hanagin in complete charge of street lighting and all other electrical work done by the city.



Howard Blackwood (second from right), member of Chicago Local 110 and installation supervisor for Chicago Theatre Supply Co., is shown indicating the finer points of the Brenkert projection equipment featured in the recently opened Miller Theatre in Miller, Ind. Second from left, and peering around the projector is Harold Butler, business agent for Local 145, Gary, Ind.

25 Years Ago—November 1922

• IA Vice-Pres. Dick Green suffered a relapse. . . . Supreme Court Justice Robert F. Wagner upheld union picketing. . . . J. C. Walton member of Local 112, Oklahoma City, Okla., elected governor of Oklahoma. . . . U. S. Internal Revenue reports for fiscal year ending June 30, 1922, indicated decrease in admission taxes collected from motion picture theatres, although taxes collected from legitimate, stock and vaudeville enterprises showed an increase for the same period. The slump in the movie industry was attributed to inferior pictures turned out for the previous year. . . . A. E. Lewellyn, financial officer for L. 586, Burkburnett, Texas, expelled from office for misappropriation of the Local's funds. . . . IA Representatives were kept on the hop adjusting disputes and complaints from Local Unions throughout the country. Among the satisfactory settlements reported were the following: IA Rep. Bill Dillon for Hartford L. 84, Attleboro L. 454, Haverhill L. 397, Manchester L. 195, New Britain L. 301, Salem L. 196, and Bridgeport L. 109. Rep. Joe Magnolia for Johnstown L. 535, Bristol L. 530, Cortland L. 272, Gloversville L. 290, Knoxville L. 197, Syracuse L. 376, and Pittsburgh L. 171. Rep. Harry Sherman for Omaha L. 343, Toledo L. 24, Springfield (Ill.) L. 138, Perth Amboy L. 379, Danville L. 158, Kenosha L. 361 and Harrisburgh L. 98.

Rep. Steve Newman for Bakersfield L. 215, Bisbee L. 353, Phoenix L. 294, Stockton L. 428, Tucson L. 298 and Los Angeles L. 150. Rep. Fred Raoul for Charlotte L. 322, Greenville L. 617, Meridian L. 616, Macon L. 507, New Orleans L. 39 and 293, and Wichita Falls L. 378. IA Vice-Pres. Bill Canavan for Decatur L. 419, Sedalia L. 135, Detroit L. 199, Lawton L. 387.

• Vic Baldassari, member of Local 303, Hamilton, Canada, spent part of his vacation taking in the points of interest in our city. He was our guest at the season's opening meeting of the 25-30 Club, and we think he carried away with him the impression of friendship and fraternalism that symbolizes all the Club meetings.

• The 25-30 Club met last month at RCA's Exhibition Hall, New York City, for a lecture and demonstration on the RCA Brenkert projector. Ralph Heacock, of RCA, dismantled the machine explaining in detail the whys and wherefores of the various mechanisms (a tip for other projection manufacturers). Other RCA representatives were there including Bernard Schultz, district sales manager and Ben Perse, New York distributor. Charlie Kellner, member of Local 306 and chief projectionist at Exhibition Hall, was in charge of arrangements. He was ably assisted by Mike Springer, also a member of 306.

• Seen here and there at the SMPE meetings at the Hotel Pennsylvania:

Jake Mitchell, sales manager for La Vezzi Machine Works, Chicago, boasted of his many years in the industry, claiming to have put in more years of service than any man present. We know that Jake has been associated with the motion picture equipment business for a long long time and we don't want to take away any credit from him but we also know that such old timers as Bill Kunzmann of National Carbon Co., Oscar Holmes of Holmes Projector, Charlie Hahn of McAuley Mfg. Co., and Herb Griffin of Librascope (and International Projector Corp.), to mention but a few, have been on the scene for well over 40 years. Jake's claim to the title for the most years of service in this industry can be disputed we believe, by any of the aforementioned.

Russell W. Kuhn, member of Local 619, Alexandria, Va., who succeeded Bobby Burns (Chicago Local 110) as Officer-in-Charge of Projection at the USN Photographic Science Lab., Anacostia, was very much in evidence at the technical sessions. Close by his side and taking an important part in the discussions was Carl Otto Swenson, member of Local 174, Lafayette, Ind.

Another interested spectator at the proceedings was Hugh J. Sedgwick, business agent of Local 303, Hamilton, Canada. Hugh is also secretary for District No. 11 and is very popular in Canadian IA circles.

One of these days we are going to ask Pete Mole, of Mole-Richardson Co., Hollywood, Calif., to write for us the story of his career. The story of how he overcame many obstacles in his youth to become one of the foremost lighting authorities in the industry should prove an inspiration to many.

Morris Kravitz, business agent for New York Local 306, placed three of his members in charge of the projection displays for DeVry Corp., National Theatre Supply Co., and Gaumont-Kalee. Each man received $150 salary for the five-day exhibition.

We were happy to greet our very good friend, Thad Barrows, former president of Local 182, Boston. Thad is hitting on all cylinders again and his many friends in and out of the Alliance will be glad to learn he has licked the ailment that laid him up for a while. He took a keen interest in the technical sessions, which attracted capacity audiences.



Thad Barrows

Harry Hollander, member of New York Local 306, seemed to be the busiest guy at the conference, driving back and forth in his station wagon between the Hotel Pennsylvania and the Mt. Vernon plant of the Maunfacturers Machine & Tool Co. to demonstrate to interested visitors the finer points of the company's "flickerless" 35-mm projector.

We were delighted to meet the founder of the La Vezzi Machine Works—Edward W. La Vezzi, with whom we enjoyed several brief chats.

• The post left vacant by the death of Joseph A. Padway, attorney for the AFL, was offered to Daniel D. Carmell, attorney for Chicago Local 110. Carmell is prominent in Labor circles, representing many union organizations in the Middle West.

• We offer our condolences to George Raaflaub, secretary of Syracuse Local 376 on the recent death of his father. Raflaub, Sr. was well known in Masonic circles, having been a 32nd degree Mason for more than 30 years.



DELEGATES TO THE CANADIAN ELEVENTH DISTRICT CONVENTION HELD IN KINGSTON, ONTARIO, OCTOBER 1922

Front Row (*left to right*): Wm. P. Covert, 4th IA Vice-Pres., Toronto; Harry Sherman, Int. Rep., member New York City L. 306; Wm. Dillon, Int. Rep., member L. 57, Fall River, Mass.; Carey, AFM Canadian Rep.; Charles C. Shay, IA Int. Pres.; Mayor Corbett, Kingston, Canada; Frank G. Lemaster, IA Gen. Sec.-Treas.; W. W. McKinnon, Mgr. IA Claim Dept., member of Westchester L. 366; P. J. Ryan, 11th Dis. Sec. and member Montreal L. 56; Joe Magnolia, Int. Rep., member New York City L. 1; Lou Krouse, Int. Rep., member L. 307, Philadelphia. Center Row (*left to right*): George J. Jones, Sec. L. 173, Toronto; unknown; J. Adamson, Peterboro L. 432; L. Ford, Brockville L. 345; Wm. Hartnett, Ottawa L. 257; Fred Smee, St. Catherines L. 461; Ladouceur, Ottawa L. 95; J. Gene, Quebec L. 523. Top Row (*left to right*): Charles Davidson, Montreal L. 262; Red Malcolmson, Hamilton L. 129, next five unknown; Frank Butler, Montreal L. 56; next three unknown; C. O'Donnell, ex-IA Vice-Pres., member Toronto L. 58.

The Triatic Signal Tracer

By EDWARD STANKO

Manager, Technical Section
Theatre Service Division, RCA Service Co.

Detailed instructions for the use under actual field conditions, together with a schematic of its circuit, of the compact yet markedly versatile Triatic Signal Tracer are given in the appended contribution. Since previous releases anent this instrument touched upon only its constructional highlights, this article may be regarded as a basic contribution to the literature of field testing units.

CAREFUL analysis of the actual experiences of several hundred field service representatives indicated that a universal portable signal tracer would prove to be a most welcome and useful addition to their test instrument kit. Such an instrument, this analysis revealed, would save much time in identifying faulty components and in locating sources of noises in audio equipment.

As a result, RCA Service Co. developed the compact Triatic Signal Tracer described herein. The development of miniature tubes contributed much toward producing this unique test instrument, for it is the small size of the tubes that permitted fitting a large array of components into a comparatively small housing.

The Triatic Signal Tracer (meaning three-in-one) is furnished as standard equipment to all RCA theatre service representatives. It is used in locating trouble and in the servicing of electronic equipment in general. It consists of an a.c.-operated amplifier, probe voltage checker, and capacity bridge. A selector switch on the front panel can be set to any one of the three capacitance ranges, or to the signal tracer position.

The amplifier has three stages of audio amplification with a gain of approximately 100 db. The power output is a little over one watt. The amplifier output is permanently connected to a two-inch p.m. loudspeaker built into the case. A jack, marked "output", is capacitance-coupled to the output tube anode for use when headphone listening is desired. The "input" jack is capacitance-coupled to the amplifier volume control and the slider arm of this control feeds the first tube grid.

A strong signal at the input jack, therefore, may be reduced to a point where it will not overload the first tube grid. The probe input jack is directly coupled to a resistor, capacitor circuit and the "magic eye" indicator. With no voltage applied to the probe and with the selector switch in the "probe" position, the "magic eye" should remain approximately half-closed.

A.F. Signal Tracing

The capacitance bridge which has three ranges will indicate capacitance values between ten micro-micro-farads and 80 microfarads. Bridge balance is indicated by the opening of the "magic eye" shadow. Two pin jacks are provided for connecting the capacitor to be measured. A well filtered 90-volt supply is available at a pin jack located on the front panel. This is used to supply polarizing voltage for a photocell.

An internal one-megohm load resistor can be connected from this 90-volt supply to the amplifier input by turning on a toggle switch. A photocell can then be connected directly to the input jack and its audio output monitor, through either the loudspeaker in the signal tracer, or a plugged-in headset.

A low-capacity shielded cable with an attached probe is used as the input lead. The case of the signal tracer is grounded to the circuit under test by means of a ground clip which is attached to the probe lead. Using a loudspeaker, or if necessary, a headset, the amplifier gain control is adjusted to give an audible signal when the probe lead is touched to the desired point on an audio frequency circuit.

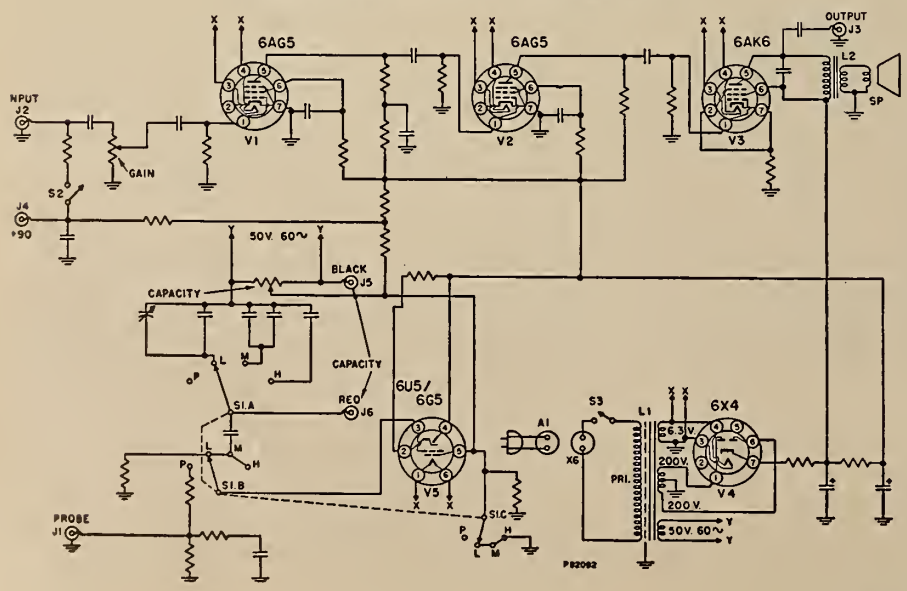
Usually, if the amplifier is completely inoperative, the first place to test should be the input circuit, to make sure that the signal is actually coming into the amplifier. When the signal has been located, the probe may be placed successively on the grid, anode, stage transformer high side connections, or coupling capacitors until the loss of signal indicates the defective part. The gain control must, of course, be reset to maintain the proper output as the probe is applied to successive stages.

Probing for A.C. or D.C. Voltages

When testing for a.c. or d.c. voltages the selector switch is connected to "probe" position. The probe lead is connected to the "probe" jack. The probe circuit consists of a resistor-capacitor and an electron-ray tube 6U5/6G5. This circuit provides a means of rapidly checking an amplifier or similar circuit to determine the approximate voltages present, the polarity, and whether the current is direct or alternating.

The probe lead may be touched to any point in the amplifier or power supply circuits, to determine the presence of voltage there, without danger of injuring the signal tracer if the potential does not exceed 1000 volts. The indicator is not used as a voltmeter, but to quickly indicate presence of a.c., a.f. and d.c. voltages. If any voltage is present,

A schematic diagram of RCA Triatic Signal Tracer.





Extreme compactness, largely made possible by the development of miniature tubes, marks the RCA Triatic Signal Tracer.

it will be indicated as follows:

(1) Positive d.c. voltage: eye will open (shadow angle increases). If the probe is removed from contact with the circuit being checked, the eye will return to its original position. The time taken for this return will be an indication of the voltage at the test point—the longer this time, the higher the voltage.

(2) Negative d.c. voltage: eye will close (shadow angle decreases, edges may overlap). Return time after removing test probe from centering is indication of the voltage at the test point.

(3) A.C. voltage: the eye will open and close rapidly, producing a blurred image. Except at low voltages, the width of this blur will not indicate the amount of voltage present. Power line a.c. will, of course, have a constant voltage; audio frequency signal will fluctuate thus producing a flickering shadow.

Using Probe Circuit in Conjunction with Audio Amplifier

When extremely low a.c. voltages are to be located with the probe circuit, it will be necessary to amplify them. In this case the signal tracing probe lead is connected to the amplifier input jack. and the amplifier output connected to the probe jack. The gain control of the audio amplifier is set approximately one-quarter open as a preliminary adjustment and thereafter regulated as required.

The presence of a.c. voltage on the probe will be indicated by a rapid opening and closing of the electron eye, resulting in the shaded or blurred edges of the image. Since some hum voltage will be picked up by the exposed probe tip, the amplifier gain control should be kept at the lowest possible setting that will give an adequate indication on the electron eye. The presence and amount of any such hum voltage can be determined by grounding the probe tip on the instrument case while watching the electron eye. The change, if any, in eye deflection will indicate the amount of stray voltage.

Measuring Capacitance

The selector switch is set to one of the three capacitor test positions, low. medium or high. The low range is for capacitors from ten micro-micro-farads (0.000010) to 8000 micro-micro farads (0.008 mfd.); the medium range from 0.001 to 0.8 micro-farads, and the high range from 0.1 micro-farad to 80 micro-farads.

The capacitor to be checked is connected to the tip jacks located on the front panel. The capacitor measuring bridge is balanced by rotating the large knob until the electron eye shadow is at maximum opening. The unknown capacitance will then be indicated by the position of the pointer on the scale which corresponds to the setting of the range switch. A high power factor, or leaky capacitor, will produce a blurring of the edges of the electron eye shadow at balance of the bridge. The poorer the capacitor, the greater the blurring.

Miscellaneous Application

To use the Triatic Signal Tracer as a photoelectric cell supply, connect the case of the signal tracer to the negative side of the phototube circuit and conneot the anode side of the photocell to the +90-volt tip jack located on the front of the panel. This circuit will supply a well filtered d.c. potential of approximately 85 volts to one photocell, or

(*Continued on page* 33)

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

V. DEVELOPMENT OF SOUND EQUIPMENT BY FOX-CASE CORPORATION

SPONABLE surveyed the Fox West Coast studios October-November 1927 with a view to converting them for sound work, and drew up designs for the first unit. The building of these studios was held up by Fox, owing—among other reasons—to the estimated cost of $250,000 being too high. In November 1927 Case suggested "noise reduction" in an affidavit dated November 28, 1927, quoted below:

"It is of great advantage when photographing sound-on-film to have the ground noise level as low as possible between words or sounds when there is nothing on the film in the form of modulation to cover up the ground noise. A method of doing this has suggested itself to my mind as follows: If the recording light which itself is modulated or by another method is modulated mechanically is only eliminated while modulation is not going on in the circuit, this would mean that when no modulation is present the light would be reduced to a minimum automatically or might even be put out entirely.

"This would mean that between modulation or between words or between sounds the negative sound record would be unexposed or white upon development. This, on the positive, would be reversed or black, thereby reducing any ground noise that there might be between words or sounds. The method of accomplishing this could be the same as is at present used in the transoceanic telephony where it is essential that automatically only one sending station is in operation.

"As soon as active modulation ceases in one direction and starts in the other direction, the modulation passing in the circuit actuates a relay mechanism to instantly put into action this sending station. In other words, in our simple modulation circuit any alternating or pulsating currents would actuate a mechanism to bring the recording light up to the brilliancy desired for the best operation of the system and while no modulation was passing, the light would automatically be reduced to the point where no record would appear on the film.

"This is signed and witnessed at 9:40 A.M., November 28, 1927 and I am now going to call up Dr. McKenzie at the Western Electric Company and inform him of this idea so that it can be put into operation, if they so desire, on their mechanical method of recording sound."

/s/ THEODORE W. CASE

During the last of 1927 and the first

(*Continued on page* 30)

† *J. Soc. Mot. Pict. Eng.*, May, 1947, p. 407.

Russell S. Blake Real Old-Timer



"OLD-TIMER" is a term susceptible to varying interpretations, and in the projection field it is applied with abandon to juveniles who started cranking a picture machine as recently as 1910. Into I. P. offices the other day, however, there strode a gentleman who, being asked how long he was at the "game," replied casually that he signed his first "operating" contract in June, 1901! He proved it, too: he showed the original document.

Moreover, Russell S. Blake (for that's his name) still is "operating" at the Loew-Poli Theatre in Hartford, Conn., having opened that house just 27 years ago. Being the wholly gracious gentleman that he is, Blake could only be a New England product. (This should cement I. P. relations with those Yankees —until we do a piece about some Texan.)

While in high school Blake developed a terrific yen to see the world, beginning with that piece of terrain known as the U. S. A. Avidly scanning *The New York Clipper*, a theatrical magazine, he noted an ad of the Mark Brothers Comedy Co. for an "electrician and property man." Upon getting the job and learning that he was to also operate a picture machine, Blake scurried about and bought an Edison Kinetoscope and a few films, some less than 100 feet long.

With Lyman Howe—Inevitably

He joined the company in Perth, Ontario, in 1901, and during the ensuing 40-week tour of Canada he learned plenty that wasn't in the Kinetoscope instruction book. During the 1902-03 season he toured New England with the Harcourt Comedy Co. and was much taken with the antics of the Three Keatons, Joe, Myra and young Buster. Many years later this same Buster was to star in many motion pictures projected by Blake.

Motion pictures at the time, of course, were mere adjuncts to the "flesh" portions of a show. Between the acts both movies and slides were used, with the former being considered the most effective "chaser" for long-sitting patrons.

Inevitably a man of Blake's attainments had to run into Lyman H. Howe, whose travelling troupe was then tops in the amusement world. The Howe show provided the fledgling operator with the opportunity for his greatest "scoop"—this in 1909—movies with sound and color! The color was the result of painstaking hand-tinting, while the various sounds were contributed by a versatile accomplice stationed behind the screen. The ecstatic reviewers were neatly hornswoggled by this dual deception.

The employment contracts Blake signed during these years were truly wondrous documents and eminently fair to one party—the boss. Reproduced elsewhere in this issue, we offer one of these "agreements," just to test the credulity of its readers, as well as for the laughs it is sure to provoke.

Blake asserts that his biggest thrill was the first time he showed in New York City with the Howe troupe at the famous Hippodrome Theatre, since demolished and now an automobile parking lot. Another thrill of a highly different nature was forthcoming when he and two other Howe troupers were stricken—in White River Junction, Vt., of all places—with scarlet fever. Blake avers to this day that there was not an inch of the Green Mountain State that wasn't fumigated, so terror-stricken were the medicos, and the natives naturally tilted their noses skyward and inquired of each other as to what else could one expect from showpeople. The boys fooled them, however, by not only recovering but also not passing the malady along.

The constant improvement in motion picture equipment through the years to its present high performance level has created its own special problems in terms of management-audience relations, according to Blake. "In the old days, he reminisces, "the folks were aware of the equipment's limitations and would wait patiently while a film was patched or a part repaired.

"So thoroughly has the excellence of both equipment and technique been sold by the energetic promotional boys, however, that audiences are now resentful of even a flickering or unsteady screen light, which they regard as an intrusion upon their personal comfort and enjoyment."

Blake and thousands of other oldtimers go on fooling them every day, however, and that pride of craftsmanship that was born on those rigorous road trips of yesteryear and which has been passed along to the youngsters in the craft will perpetuate the show business ideal of service and then more service to the paying customer.

How it Was Done in '03

A verbatim copy of the fateful letter which set Russell Blake's feet on the show business path is appended:

Wilkes-Barre, Pa., U. S. A.
July 12, 1903

LYMAN H. HOWE'S
HIGH-CLASS MOVING PICTURES

Mr. R. S. Blake
Terryville, Conn.
Dear Sir:

Your favor of the 11th in answer to my ad in "Clipper" received. I expect to be in New York City on Wednesday and would like to meet you there for interview. I will stop at the Morton House (14th St. and Broadway). I will pay your railroad expenses from Terryville to New York and return. If you are a clean, straight and reliable young man, this will be the beginning of a long pleasant engagement. On receipt of this please wire me stating whether or not you can meet me in New York, between 4 and 6 o'clock Wednesday (15th).

Very truly yours,
LYMAN H. HOWE

B & L Celebrates 94th Anniversary

Bausch & Lomb Optical Company of Rochester, N. Y., celebrated its ninety-fourth anniversary as an optical firm on November 3. Founded by John J. Bausch and Capt. Henry Lomb, with $60 capital in 1853, the firm is the world's leading producer of scientific optical instruments and has offices in the principal cities of the globe.

The company's first contribution to the optical industry was the installation of the first power lens grinding machine in America, eight years after its organization. The first large scale manufacture of microscopes in the U. S. was started by Edward Bausch, the founder's eldest son. Within the next few years, photographic lenses were perfected; bifocal lenses, binocular microscopes and iris diaphragm shutters were introduced.

During the Spanish-American war, the firm produced the Navy's first fire control instruments, used by Dewey at Manila. In 1915, William Bausch, another of the founder's sons, turned out the first pure melt ever produced in America. During World War I, B&L was the sole source of supply of optical glass and fire control instruments for the American fighting forces.

During the last war, the story was repeated on an infinitely more extensive scale. The B&L binoculars, bubble sextants, rangefinders, aerial mapping equipment, radar optics and mobile optical units proved invaluable assets to U. S. combat forces throughout the world.

RCA Net Increases 50% in Year

Net income for the first nine months of 1947 has soared to $12,233,758, in comparison with an $8,226,329 figure for the same period last year, RCA has announced. Total gross for the same 1947 period was almost $225,000,000 as compared to $163,500,000 in 1946. After payment of preferred dividends, net earnings are equal to 71.1 cents per common share this year, an increase of almost 29 cents over last year.

WHY ACETATE FILM?

by ROBERT MITCHELL
Graphic Theatres Circuit

A noted contributor to the literature of the art questions the necessity for the introduction of acetate film.

ONE cannot help wondering just what this substitution of acetate for nitrate film business is all about. The inside story, it seems to the writer, would make for extremely interesting reading, especially if, as is widely suspected in the craft, the licensing of projectionists would be vitally effected by any widespread use of acetate stock.

The safety factor of acetate film is undeniably an asset in situations where *non-professional or untrained projectionists are in charge;* but the skilled projection specialist may legitimately question whether this factor is of any value to him. In the hands of competent projectionists nitrate film very rarely ignites or "explodes"—the latter being a euphemism employed to "explain" film fires when the real reason is not known.

Defective Equipment Chief Offender

Defective or worn projection equipment is the cause of more than 90% of all projection room fires—but we don't see any frantic rush on the part of either the fire authorities or the exhibitors to provide an adequate periodic inspection system to obviate this trouble. Naturally not, since their primary interest is to *save* money not *spend* it.

The great majority of the old-timers, with years of projection experience behind them, have never had a film fire. Moreover, damage to the projectors can result as readily from a pile-up of acetate film as from one of nitrate film.

In the event of a film stoppage in the gate (an unusual occurrence) a film fire hardly ever results from nitrate film. A frame is burned out of the film, to be sure, but under similar circumstances acetate film suffers the same fate. The raw stock manufacturers' assertions anent the durability of acetate film have yet to be verified in the projection room. I believe that most projectionists hold the opinion that even the new type acetate stock does not compare favorably with regular nitrate stock in resistance to heat and wear.

I hasten to concede the nuisance value of acetate stock, but I cannot quite understand some of the reported difficulties in splicing the stuff. Projectionists who have yet to receive an acetate print should nevertheless not neglect obtaining a supply of safety film cement (or a dual-purpose cement for both nitrate and acetate stock). Why get caught without the necessary materials?

Substitute Splicing Aids

In an emergency, however, the projectionist can save the show and his professional dignity by keeping in mind a few simple expedients. Most drugstores and photographic shops carry small bottles of cine safety film cement for the home-movie trade. This liquid is identical with the safety film cement which the theatre *should have ordered* from its supply house.

In lieu of a regular safety film cement, however, the druggist can supply glacial acetic acid. No prescription is needed. This clear, watery liquid makes a perfect acetate film splice, and its viscosity can be increased for easier application by dissolving a few scraps of clean acetate film base in it. Glacial acetic acid "cuts" rapidly, but it has the disadvantage of a corrosive action on the skin and an overpowering odor. Excess acid should be wiped off the splicer to avoid injury to exposed metal parts.

No special comment concerning Trucolor prints is necessary. Such prints are handled the same as any other double-coated films (Cinecolor, Magnacolor, *etc.*) except that the film base is acetate and hence must be spliced with an acetate-joining material.

The projectionist should be on the watch for black-and-white acetate shorts, and the best way to catch them is to examine the edge-markings of every short subject which does not belong to a regular well-known series.

Ordinary black-and-white acetate film has the soft, "thin" feel of nitrate news stock. The feel of film cannot always be trusted, but it saved the day for me when I encountered an *acetate* leader on a *nitrate* subject. There were no edge-markings on the leader, but I confirmed my suspicions by trying to light a clip from it with a match. It just fizzled.

PROJECTIONISTS' SERVICE MANUAL
$3.00



THE MOST SUCCESSFUL ROADSHOW IN AMERICAN THEATRICAL HISTORY

Do you know any of these old-timers? Personnel of the Lyman H. Howe troupe in 1903: *(front row extreme left)* Howe; *(extreme right)* S. Max Walkinshaw, manager No. 1 company, later general manager; *(second row center, in derby)* Chester S. Strontenberg, "operator"; *(next, in cap)* Le Roy Carleton, "sound effects man"; *(third row left, in derby)* Will C. Smith, "operator" with No. 2 company and later president of Nicholas Power Co., makers of the Powers Cameragraph, and much later with National Theatre Supply Co.; *(next to Smith, in derby)* W. C. Pflnegar, booking agent; *(next right, in soft hat)* Paul Felton, musical director; *(next right, in sailor straw and high collar)* Russell S. Blake, "operator"; *(back row, tall man)* Mr. Wilson, manager No. 2 company; *(lady)* Mrs. Wilson, musical director No. 2 company.

AT YOUR SERVICE

This department is devoted to the man behind the man behind the gun—the serviceman. Its prime purpose is to promote a closer relationship between projectionist and serviceman based on a better understanding of their mutual problems through an exchange of news and views, kinks and kicks. Contributions from both groups are invited.

Protect Sprocket Puller With Thumbtack

A thumbtack inserted in the sprocket-retaining screw hole of the 208 reproducer sound shaft makes a good bearing surface for sprocket-puller screw, when sprockets are stuck and have to be pulled off. Convex construction of tack head makes it strong, and it won't spread or bind in the sprocket or the shaft.—R. M. Porter, *ALTEC.*

Faulty Tube Contacts

I have found that in cases where there is continuous trouble with tube prongs corroding and flattening out, it is due to socket contacts rather than the materiel in the prong tips. Arcing generates heat, melting the solder on the tips. Where there is arcing one will generally find corroded and pitting socket contacts. Not news, this, but with good contacts there is no prong trouble.—Louis Wolff, *ALTEC.*

Inspecting Tungar Bulb Filaments

In order to prevent eyestrain while examining tungar bulb filaments, a projectionist I know mounted a piece of colored glass within a frame formed by a piece of wire. I snitched the idea and now carry this item in my regular tool kit.—W. V. Howard; *ALTEC.*

Reducing Flutter on Universal Base

Projection angle would seem to bear little if any relation to flutter, but I am convinced that it does. Every time a system with little projection angle was modified for power and Lansing horns the same trouble developed. Using the flutter bridge, I got a little reduction here and there by replacing sprockets, *etc.*, but the trouble hung on, especially with Technicolor film not clinging to the sound sprocket.

Observing that this difficulty held true only with equipments having 5° or less projection angle, I finally eliminated the trouble with a nickel's worth of washers and pushed the film chute another 1/8th inch or better toward the sound sprocket. In six months there has been no recurrence of this flutter trouble in three theatres that previously were plagued by it. I think my simple remedy licked the problem.—W. S. Welshonce, *ALTEC.*

Exhaust Fan Affects Reflectors?

A projectionist was having difficulty keeping his reflectors from fogging. The reflectors were very hot. The arc normally pulled 65 amps, but in order to overcome the extreme heat the current was reduced. Of course, picture quality was impaired.

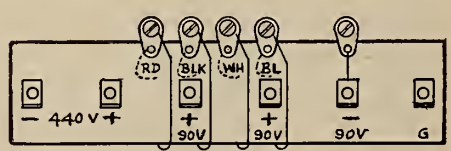
Investigation revealed that the exhaust fan was filled with carbon dust, the blades being coated even though the damper was wide open. A screen in a gooseneck of the exhaust pipe was entirely plugged with carbon dust.

A general cleaning of the parts involved resulted in satisfactory operation with the damper only partially open; full current was restored to the lamps, the picture image was improved, and everybody is happy.—H. M. Steele, *ALTEC.*

Testing Condensers in D-96101 Filter

In order to facilitate the testing of condensers in the D-96101 filter, I have made the following modification: five terminals are installed at the top of the terminal strip, as illustrated. The cable form of four leads, which now goes to the positive terminals of the four condensers, is pulled back and connected to the four terminals at the left; the terminal at the right is connected to the 90-volt terminal. This latter terminal is for connecting negative leads of condensers with pigtails when this type replacement condenser is used.

New leads are brought out from the condenser positive posts (or the red



wire on condensers with pigtails) and are connected under the screws of the new terminals.

By merely removing these wires from the screw terminals, the condensers are disconnected for testing without the necessity of removing the filter chassis from the cabinet. This eliminates repeated bending and heating from soldering of the lead cable of the 90-volt circuits.—R. P. Egry, *ALTEC.*

Substitute RCA 6C6 Tubes

On the early production of Motiograph pre-amplifiers they used W. E. 310-B tubes. The middle tube has high cathode potential and will occasion hum if the least bit leaky to the heater circuit. The installation of RCA 6C6 tubes will improve this condition materially.

Then again, if the pre-amplifier is installed with other than Motiograph soundheads, or on other heads not having a resistor from the p.e.c. cathode to ground, much difficulty is experienced. The installation is noisy, and after the mechanism is started the volume drops considerably in about two seconds. This is due to the limited action at the pre-amplifier in the absence of a resistor to ground.

The p.e.c. cathode feeds the .05-mfd. capacitor direct, which soon charges up. The 2.2-megohm resistor to ground is needed to remove this charge. It may be installed at the low-capacity cable connection in the pre-amplifier.—H. H. Quackenbush, *RCA.*

Adjusting Reel Tension Without Gauge

Needless to say, considerable film is damaged and sprockets are prematurely worn due to excessive film tension. Perhaps one of the most simple and practical methods for adjusting the lower takeup for proper tension is to proceed as follows:

1. Place a full reel in the lower magazine.
2. Adjust the tension nut until the reel will barely pick up speed with the machine. It may be necessary to repeat several times before proper adjustment is attained.

When this is properly done the film will not be subjected to excessive tension, yet at the same time will eliminate all possibility of piling-up of film in case the machine is stopped for any reason during the middle of a reel and then started up again.—Altec Eng. Dept.

Bulb Rectifier Relay Failures

In May, 1946, I installed a pair of bulb-type rectifiers, using six 15-ampere Tungars. It was for 220-volt, 3-phase, 60-cycle supply. After ten months I had an emergency call because two opposite tubes did not light. This was due to burned contacts on the relay (General Electric A. C. Contactor Type CR2810-1820 B2). To get at this relay requires

(*Continued on page* 35)

LIGHT GENERATION BY H. I. CARBON ARCS

(*Continued from page* 18)

may be employed, with a minimum protrusion of the positive carbon beyond these jaws.[5] The more efficient heat dissipation thus obtained permits the use of substantially higher currents and the achievement of correspondingly higher brilliancies. The added complication of arc operation with water-cooled jaws has so far prohibited their use in many applications. However, in motion picture studios where background projection is frequently employed to provide the setting for a physically distant location, operation with water-cooled jaws to achieve the brightest possible background image is receiving active experimental consideration.

It is hoped that these theoretical considerations, assembled in the course of arc-carbon research and development, have proved of interest outside that limited field. Not only the designers and the operators of the many types of burning mechanisms which facilitate the generation and release of this benign form of atomic energy, but also the many artisans engaged in the control of this energy to create wanted effects on film and on the motion picture screen, are all dependent upon the radiant output of the carbon arc. It is to them that this paper has been directed.

DISCUSSION

MR. DOFFER: The speaker mentioned that carbon is a very good electrical conductor, therefore you had a low loss. Why do some carbons have a copper coating on them?

MR. F. T. BOWDITCH: Carbon is not so good an electrical conductor as copper. I didn't mean to imply that. But as compared with other materials which remain solid at a comparable temperature, carbon is an excellent conductor. A copper coating is applied to carbons in services where the current must be carried throughout the length of the carbon from fixed clamps at the end farthest from the arc. Bare carbons are ordinarily employed with current jaws which grip the carbons close to the arc, and through which the carbon is pushed forward by a feeding mechanism at the rear.

MR. READ: Does the alternation of the electron path from points *A-B* to points *A-C* take place about once a second or does it occur at a rate which produces an audible note?

MR. BOWDITCH: I did not mean to imply there was any alternation whatever.

MR. READ: I don't mean alternating current.

MR. BOWDTCH: The picture we have, and the picture I intended to portray, is that at reasonable currents, well below the overload limit, practically all the electrons take the longer path to the base of the crater. This is so because it only requires an anode drop of perhaps five volts to transfer electrons from the arc stream into the core at this point, as compared with 35 volts directly to carbon at the crater lip.

Now as the crater becomes deeper, more and more electrons consistently take the shorter path to the crater lip (not first this way and then that way), until a sufficient electron concentration is developed to generate a very intense heat at that point. Every electron entering the carbon releases 35 electron-volts of energy as it lands there, and so is responsible for a very high concentration of energy.

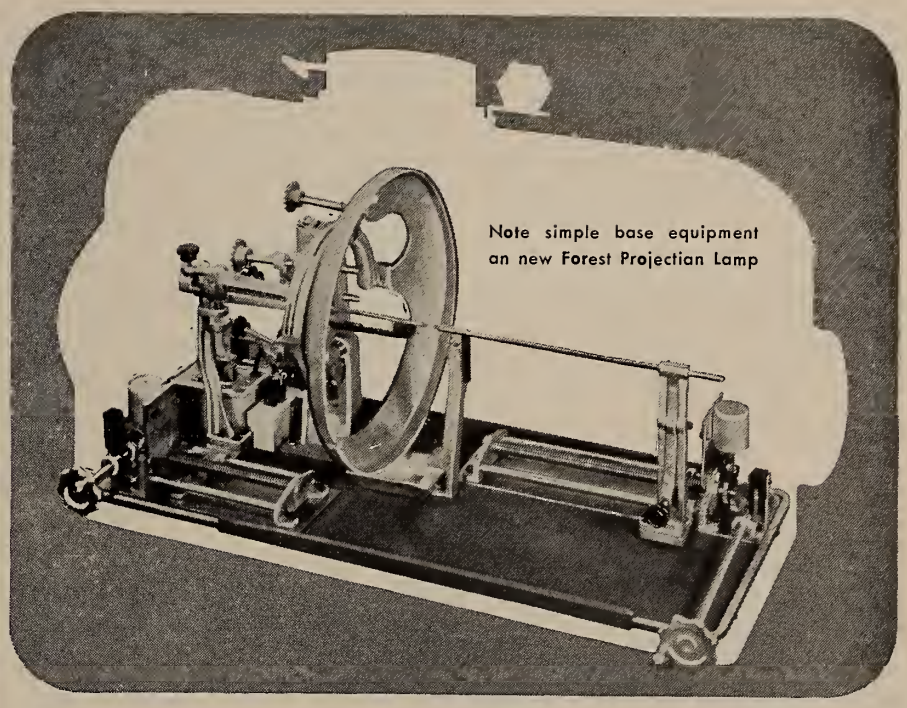
MR. O. E. MILLER: Do you have positive-ion current in appreciable amount?

MR. BOWDITCH: Our measurements indicate that the positive ions carry only a small percentage of the total current. There is such an effect. However the energy relationships indicated by the crater radiation spectrum show that only a very small percentage of the rare-earth atoms are ionized. Positive-ion current, while present, is therefore considered to be a minor factor in the light-producing relationships involved.

[5] JONES, M. T., ZAVESKY, R. J., and LOZIER, W. W.: "A New Carbon for Increased Light in Studio and Theatre Projection," *J. Soc. Mot. Pict. Eng.*, Dec., 1945, p. 449.

Kodak's 15,000 Tons of Ice Daily

To control production and processing conditions and to air-condition the many buildings where Kodak films and papers are made, a refrigerating unit with an average daily production equivalent to 15,000 tons of ice is operated at Kodak Park.



The Inside Story on the New FOREST Electronic Projection Lamp

One look at the inside of the new Forest Electronic Projection Lamp will demonstrate the reason for its dependable operation, economical maintenance and trouble-free performance.

Simplicity is the keynote of Forest construction. Note the lack of complicated gearing mechanisms, cams and other fast moving parts. Through the use of Electronic timing and solenoid actuation of carbon feeds, Forest has successfully eliminated more than 300 components.

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7 Forest Electronic Advantages

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- Low-Cost Operation
- Electronic Timers
- Unit Construction
- Solenoid-Actuated Carbon Feed

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Now Available For Quick Delivery!

See Advertisement Page 31 for Data on Rectifiers for Use with Forest Electronic Projection Lamp

Kodak Discloses Wartime Camouflage Detection Film

ESPECIALLY developed for wartime aerial photography, a new film which can pierce camouflage by photographic detection of synthetic coloring, was unveiled in Cincinnati last month by Dr. Walter Clark of Kodak Research Laboratories, speaking before the fall meeting of the Optical Society of America.

Known as *camouflage detection film*, the unusual material is a combination of color and infra-red film and pierces camouflage by providing prints in false colors so that camouflage paint appears red against the green background of natural grass. Basis infra-red photography has also been used for camouflage detection because green paint, which may match grass and foliage visually, usually has much stronger absorption in the infra-red and thereby prints dark on an infra-red photo.

New High Speed Color Film

Pointing out that over 80 per cent of our wartime intelligence reports concerning the enemy was derived from aerial photo reconnaissance, Dr. Clark said that during the early part of the war, a special film known as Kodacolor Aero Reversal was devised for aerial color photography. This film was so designed that it could be developed in the field and was widely used for reconnaissance in both the European and Pacific theatres.

Continuing his discussion of aerial photography, he mentioned the important role it has played in the preparation and revision of maps, pointing out that accurate measurements can be made from large numbers of aerial photographs in a short time; while ground surveys would be long, difficult and sometimes impossible. Photography from the air can also be used in geological and hydrographic surveys, crop and soil erosion studies, railroad and highway building and pipe and power line surveys; he told the meeting.

Infra-Red Photography

"In many cases," he stated, "special requirements caused by the peculiarities of this type of photography make demands not usually encountered in ordinary work. For instance, aerial photos are always made from cameras on moving bases, so that the film must be very fast. Since a certain amount of haze always exists between the airplane and the ground, tending to flatten out ground detail and make it indistinguishable, aerial film must be able to increase the contrast. Not only that, but it must also respond to green and red light so that it can be used with filters and at the same time not produce too grainy a picture."

"In extreme cases," he continued, "where long distance or high altitude photography is necessary, the obscuring effects of haze may be so pronounced that it becomes necessary to use infra-red film."

In concluding his discussion on infra-red photography, Dr. Clark declared that such radiation can penetrate haze and show up details otherwise invisible. This type of photography has proven most useful for forest surveys since the softwood trees develop dark and the hardwood trees develop light, thereby making it possible to distinguish individual trees or clumps of trees from one another in forest areas.

RCA Victor Awarded Navy Citation

For services rendered the United States Navy during its 1947 Reserve recruiting campaign, the RCA Victor Division of the Radio Corporation of America at Camden, N. J., was awarded a citation signed by the Secretary of the Navy and Chief of Naval Operations, Fleet Admiral Chester W. Nimitz, USN.

Vice Admiral James L. Kauffman, USN, Commandant, Fourth Naval District, presented the award along with individual citations to Frank M. Folsom, executive vice president in charge of the Division, John K. West, public relations director, and Robert Merrill, Metropolitan Opera star.



Process backgrounds with

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FILMING technique often calls for projected process backgrounds instead of location shots. To obtain maximum edge-to-edge brilliance, contrast and sharpness in projecting backgrounds, many leading Hollywood photographers depend on Bausch & Lomb Projection Lenses. Only the finest quality lens could meet this tough test satisfactorily, because critically precise camera lenses pick up flaws in the projected image.

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PERSONNEL

Two new RCA appointments in the Tube Department: G. R. Rivers as Manager, Tube Sales Group and G. H. Myers as Manager, Customer Service Group: a new unit responsible for sales engineering and expediting.

* * *

Joseph P. Maxfield, recently retired from Bell Telephone Labs, has been appointed Consulting Engineer for Altec Lansing Corp. Internationally known pioneer in the science of sound, he had taught applied electronics at MIT and during the recent war, was director of Duke University's Division of Physical War Research, while on leave from Bell Labs.

Maxfield was the major influence in the development of electrical recording, especially in the original adaptation of sound recording to motion pictures in 1926.

* * *

O. C. Johnson, assistant chief engineer of Westrex Corp., foreign motion picture subsidiary of Western Electric, has returned from a four-month trip throughout Latin America, acquainting company engineers with new techniques and testing equipment developed by the industry.

Most engineers in Latin America, he reports, have made it a point to become familiar with the English language in order to understand technical bulletins and discussions in the American trade press. Latin American technical personnel are said to be keenly interested in learning everything possible concerning new developments and their application to problems peculiar to foreign language countries.

* * *

Perry R. Shean, former manager of Western Electric's Panama office, has returned to New York to assume new duties with the engineering department of the Westrex Corporation. Mr. Shean was succeeded in Panama by Douglas J. G. Johnson.

* * *

Lane J. ("Pat") Patton, formerly Altec Service's district manager at Atlanta, has been transferred back to the Engineering Group in New York. "Pat" also serves as chief editor of the *Altec Exchange*. He is being replaced in Atlanta by D. L. Turner, recently promoted from branch manager.

OSRD Reports Solution of Tropical Ravages to Optical Equipment

A report by the Office of Scientific Research and Development of the U. S. Department of Commerce, recently made public, reveals wartime research for the prevention of deterioration of optical instruments, photographic equipment and other material in tropical climates.

Edited by the technical aide to the research committee, the report explains the effect of heavy rainfall and high relative humidity, stating that such factors furnish ideal conditions for the growth of micro-organisms which collectively attack a wide range of basic materials. Fungus and bacteria cultures were collected for research and study and several positive remedies were discovered.

One of the most outstanding developments was an adequate method for controlling fungus growth within optical instruments. It consists of applying a mixture of 50 per cent of the fungicide "Cresatin" (metacresyl acetate) and 50 per cent ethyl cellulose enclosed in a small aluminum capsule with minute openings. The capsule is cemented within the instrument out of the path of light rays. Under drastic conditions in the Panama jungles, the capsule prevented deterioration of binoculars for twenty-one months.

Copies of the report may be obtained from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C.

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Projectionists'

SERVICE MANUAL

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1 Bad sound breeds audience indignation—results in refund demands or stay-aways.



2 May even close your theatre at the peak of a smash-hit run.



3 RCA Service is your safeguard—your protection against sound breakdowns.



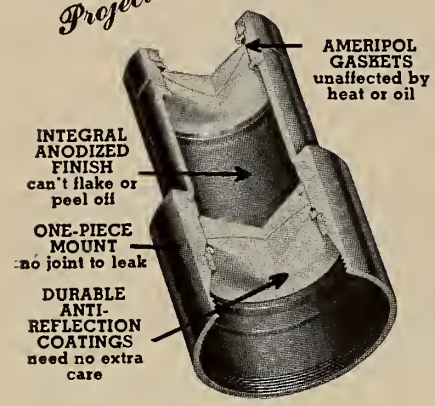
4 Keeps your box office busy catering to patrons who make your theatre their favorite.

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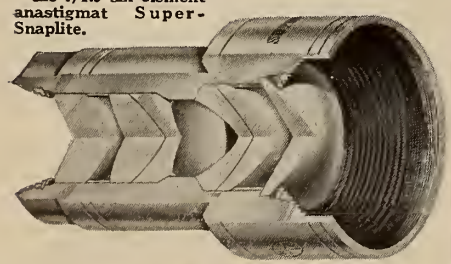
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THE HISTORICAL DEVELOPMENT OF SOUND FILMS

(*Continued from page* 23)

months of 1928, there was much activity in organizing and in developing sound equipment by the Fox-Case Corporation. Sound News outfits were put in the field at the rate of one or two a month. Various short subjects and productions were made in the studios, largely to learn the best uses for sound and its limitations. Many silent pictures were synchronized. A test was made combining Technicolor with sound. A cartoon was made with sound effects.

Fox-Case Activities

May 10, 1928: A non-exclusive agreement was made between ERPI and Fox-Case—effective April 2, 1927. The royalty arrangement was changed from 8 per cent of the gross to $500 per negative reel for domestic release and a schedule for release in foreign countries that added up to a second $500.

May 1928: Equipment for three studio recording units was ordered by Fox-Case in anticipation of its coming West Coast studio demands.

During the spring of this year, Winfield Sheehan, in charge of production at the Fox West Coast Studios, who did not believe too strongly in sound in the beginning, came East and was anxious to arrange to get started on West Coast studio sound productions. He had taken over two news outfits that were originally assigned to West Coast news work. With these the Fox studio made a two-reel dialogue comedy, "The Family Picnic."

June 18, 1928: This opened as part of the program with "The Air Circus" (synchronized sound) at the Globe Theatre in New York.

June 25, 1928: A Movietone field projector truck was used on Broadway to ballyhoo "The Red Dance" at its premiere. This out-of-door portable sound projection unit was a development of Fox-Case that has been used to some extent for political and commercial purposes.

Large Scale Operations Planned

It now became Sheehan's desire to get into sound as quickly as possible. This was accelerated by the fact that other producing companies were already starting. He brought various members of his producing staff East to work out a way of starting this work, and placed his Movietone development under the direction of his studio manager, Ben Jackson. They returned to Hollywood on July 12, 1928, taking practically the entire staff of engineers from Fox-Case. Operations were planned on a large scale.

July 1928: Equipment for nine West Coast recording units was ordered.

July 28, 1928: Several Movietone stages were started at Fox Hills, on a location which was previously used to corral Tom Mix's horses. These were erected under the direction of Mr. Sheehan, with C. H. Muldorfer as architect and H. K. Weeks as construction engineer. The completion of these sound studios and accessory buildings was accomplished with great speed and with much credit to the men responsible for the work. The whole plant took form in approximately ninety days.

Aug. 1928: Equipment for twelve more West Coast recording units was ordered, making a total of twenty-four.

Sept. 1928: Equipment for three European recording units was ordered. These orders from Fox, together with those of other companies coming into the field, swamped the facilities of the Western Electric Company and made deliveries of equipment very uncertain.

This period was marked by a rapid growth of the technical staff of the Fox-Case Corporation. Many contributions were made by various individuals, particularly L. B. Hoffman, L. W. Davee, A. J. Sanial, H. E. Bragg, H. F. Jermain, Walter Hicks, R. F. Nicholson, and W. F. Jordan. Nineteen newsreel field outfits were operating. The crews of these units did much to overcome the

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initial difficulties of field operation.

Sept. 1928: Fox Movietone City was dedicated. (This is the present Twentieth Century-Fox Studios at Beverly Hills, Calif.)

Oct. 6, 1928: The Fox Movietone News release was increased from one to two issues per week.

Dec. 1928: "In Old Arizona," the first out-of-door recorded feature picture, was shown at the Criterion Theatre in Los Angeles. Quoting Franklin: "This film was photographed and recorded outdors against a sweeping background of natural beauty, and in it sound recording achieved its highest artistic success up to that time. Filmed and recorded right in the vast open spaces, the scenes and human voice and all the accompanying sounds were reproduced with a clearness and naturalness that attracted wide attention.

The Movietone process caught and reproduced with fidelity not only the voices of the actors, but actually the natural sounds of the outdoors; the whispering of the wind, the song of the birds. The picture was thus notable in combining the perfected technique of the silent film with the faithful recording of music, dialogue and sound."

Subsequent Fox pictures that were well received and helped to advance the art of sound recording included the all-talking pictures "Through Different Eyes" and "Hearts in Dixie."

Dec. 3, 1928: Fox Movietone News release was increased to three issues per week.

Movietone Technique Improved

During the year 1928, appreciable general progress was made in perfecting Movietone technique; one point of note was the perfecting of the Aeo lights by Case, increasing their useful life and uniformity.

Sponable organized a research department to which was assigned the problem of improving sound recording apparatus, particularly with a view to reducing its weight and improving its portability and ease of operation—as well as the over-all problem of improving recording and reproducing equipment and techniques. Fifty-six field units were scheduled for assignment all over the world; three special Aviation Units were activated; to meet the need for such an increase in personnel, Bragg was sent to interview recent graduates at various technical institutions. Well over 100 engineers were now engaged in the sound recording field.

Feb. 28, 1929: Fox acquired control of Loew's and MGM.

Mar. 1929: Fox announced that all silent product would be discontinued and only Movietone pictures would be made.

July 15, 1929: The Fox Movietone News release schedule was increased to four issues per week.

July 18, 1929: William Fox was injured in an automobile accident; this may have seriously affected the following up of his involved negotiations.

July 1929: British Movietone News, the first foreign sound newsreel producing company, was started.

Aug. 1929: A merger of Fox Film, Fox Theatres, and Loew's was planned.

Sept. 20, 1929: Fox negotiated a deal acquiring Fox-Case stock from Case and exchanging Fox Theatre stock to be redeemed September 1, 1930. Fox then formed the Fox-Hearst Corporation. Hearst acquiring about 24 per cent of original Fox-Case stock with option to buy about 25 per cent more. Fox made a separate agreement with Case to have the latter run his laboratory until July 23, 1930.

Sept. 1929: Fox and Hearst united their sound newsreels and agreed that each would release two per week.

Sept. 17, 1929: An all-Grandeur show opened at the Gaiety Theatre with Grandeur News and "Fox Movietone Follies."

Sept. 28, 1929: Hearst Metrotone News released its first issue.

Nov. 2, 1929: The Embassy Theatre was opened with the first all-sound news program and called "The Newsreel Theatre."

1930: The crash of 1929 found the Fox structure in such a condition of over-expansion that it became necessary for Fox to sell out.

Controlling interests in Fox Film and Fox Theatres were acquired by a group headed by Harley Clarke, who became president of the Fox companies.

Sound-on-film by this time was well established as a commercial success and was displacing sound-on-disk as a release medium. The Western Electric light-valve method of sound-on-film recording was commercially perfected. As Fox Film was a licensee of ERPI, and as such paid the regular royalty rates, it decided to give up its own method of Aeo light recording and use in entirety the Western Electric system.

[To be Continued]

I. A. Elections

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MODEL 75-V-6 . . . The result of highly technical knowledge gained from building rectifiers for radar and other intrinsic scientific devices—achieving a new high for rectification efficiency at the lowest possible cost of power. Designed for all theatres using Suprex or Simplified High Intensity Projection. Built-in remote control relays with provisions for operating spotlights. Full 3-phase rectification. No moving parts. Power with flexibility—constant and uniformly smooth current—no flicker. Quiet and ease of operation. Sturdily constructed all steel case.

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➔ **SEE PAGE 27 FOR FOREST ELECTRIC PROJECTION LAMP**

Each year ot this seoson IP is glad to extend space to the Notional Tuberculosis Association to pramote the sole of that mighty mite, the Xmas Seal, the praceeds of which have helped so mony showfolk.

TRACKING DOWN A KILLER

By Paul F. Ellis

BY THE time you finish reading this, a most insidious killer will have struck. His victim might well be you or one of your loved ones. This killer slays a person every ten minutes. He is of the most vicious type. In most cases he is at work for weeks, sometimes months, even years, before he gets a death grip.

This killer is tuberculosis.

There are thousands of medical sleuths on his trail. They've got his finger prints. They know how to control him and one day this killer himself will be killed. When that day arrives depends entirely upon the help and cooperation of you—and by "you" we mean the American public.

Mass X-Rays the Answer

This can be done through more and more mass X-rays—in the school, the factory, in the whole community. Science, through its microscopic eyes, can recognize the germ that causes tuberculosis. Science, through the X-ray, can detect tuberculosis at work—even though there are no outward signs of the disease.

It has been estimated there are 500,000 persons with tuberculosis in the United States. Of that number, only about 250,000 have been reported to health authorities. Most of these persons are in luck. They've got a good chance to throw off this killer. They can begin treatment to protect themselves from the killer.

The other 250,000 persons are not so lucky. The killer is working on them right now—even as you read this. Many thousands of those unlucky ones will die. As time goes on still more thousands will be invaded by the killer.

One way to bring these figures down is to have X-ray photographs of the chest. The health detectives—and they are right—insist that every adult, everywhere, needs a chest X-ray to make sure his lungs are healthy. And every adult needs an X-ray regularly to make sure his lungs stay healthy. The process is simple. The picture can be taken in a matter of minutes. If TB is found, then treatment should be started. Your life can be saved. If no TB is found, you'll feel fine—because that is good news.

No Known Effective Drug

Don't think for a minute that your doctor can give you a drug which will cure your TB overnight. Some drugs are now being tested, but the sure way to beat TB is bed rest under medical supervision, preferably in a TB hospital. That protects you as well as your fellow Americans.

A tuberculosis control program designed to run down this killer is being conducted by 3,000 groups affiliated with the National Tuberculosis Association.

Yes, it takes money. That's where the annual Christmas Seal Sale plays its part. These funds can be the handcuffs that will shackle TB for keeps.



10 Million Audience Potential for Convention Telecasts

With Philadelphia as the choice of both major political parties for their 1948 national convention site, a possible television audience of 7-10 million is foreseen. Coverage of both conclaves on the Eastern and Mid-Western network of over 20 stations will be the forerunner of a coast-to-coast hookup, it is said, and will hasten by many years installations in other sections of the country.

Audience estimates are based on reported video receiver sales which have increased to 32,000 monthly. This rate is expected to be greatly increased in 1948. Tele-coverage of the meetings will cost an estimated $100,000 each, the expense being divided between the networks and the individual stations.

New Snaplite Lens Container

Inaugurating a new method of packaging projection lenses, Kollmorgen Optical Corporation of Brooklyn, N. Y., will ship all their Snaplite Series II and Super-Snaplite lenses in a new dual purpose container.

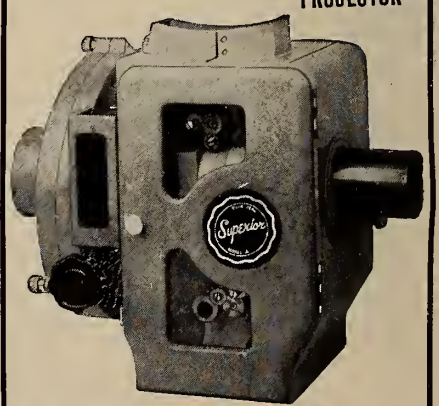
Each lens is snugly cradled in an individual trough with recesses to accommodate shade tubes and clamping rings. The entire interior of the container is lined with a rich velour finish to cushion the lenses and the exterior is covered with oil and moisture resistant leatherette.

After the lenses are installed in projectors, the container can be bolted or screwed to the projection booth wall. Since the manufacturer recommends removing and cleaning lenses after each "break," this new dustproof container will serve as a handy cabinet. Space is also provided in the lower compartment for storing lens cleaning equipment, including brush, cleaner and tissue.

The Projectionists' Projector

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TRIATIC SIGNAL TRACER

(*Continued from page* 23)

a somewhat lower vlotage to two cells or a PEC network.

For testing of photocells and the adjustment of optical systems, disconnect the photocell from the *idle machine* and connect it to the amplifier input lead of the signal tracer, with the anode (plus lead) of the photocell to the center or tip of the input cable, and the cathode (minus lead) of the photocell to the ground clip of the input cable. The signal tracer is grounded and the +90-volt switch, located on the front of the panel, is turned to "on" position which connects the +90 volts directly to the amplifier input cable.

The amplifier section of the signal tracer is useful for testing microphones and phonograph pickups and other electronic devices. The microphone to be tested is connected to the amplifier input lead, with the "high" side, if any, of the microphone connected to the center, or tip, of the lead, and the "low" side of the microphone to the ground side on the input. Speaking into the microphone or exposing it to some other power source and listening to the reproduction in the speaker of the signal tracer will give an approximate indication of the condition of the unit under test.

The amplifier may also be used as a means of communication between projection room and stage when tracing wires or making circuit adjustment. Connect a microphone to the amplifier input, and connect amplifier output to a stage line or run a two-conductor cable backstage to which a small speaker is attached. If a shielded cable is available from the projection room to the stage, a microphone may be placed in the projection room and connected to the amplifier input, the amplifier being located backstage. In this case the speaker supplied with the signal tracer is used. Communication by means of this instrument will save hours of valuable time.

BOOK REVIEWS

TELEVISION TECHNIQUES BY Hoyland Bettinger—237 *pages*, 29 *drawings and* 18 *photographs. Published by Harper & Brothers, New York, N. Y.* $5

A complete guide to television production and showmanship, this book should interest anyone connected with television, from the technician to the sponsor. Beginning with a simplified discussion of video principles, it continues through the study of visual continuity and composition. Such factors as eyestrain, audience orientation and "tricks of the trade" are discussed, along with a comprehensive study of microphones, recordings and other television fundamentals.

In addition to the elementary and technical phases of the subject, such important aspects as television writing, directing and producing and motion picture and film integration. No elementary "how-to-do-it," the volume is written as an explanation of the underlying principles and fundamentals that analyze the factors entering into all types of production, rather than as a text for teaching cut and dried methods. The application of the principles involved are set forth in such a way that one may apply them according to his own tastes and in his own way.

The author is a consultant on television programming and production, formerly general manager of the GE television station, WRGB at Schenectady, N. Y., His theatre and motion picture background, plus his intensive television experience qualifies him as an authority, not to be disregarded. G.E.N.

Loew's Net Down in 1947

Net profits for Loew's, Inc., for the year ending August 31 last are estimated in Wall St. circles at about $2.75 per common share, as compared with the $3.52 reported by the company for the preceding year. Earnings for the last quarter of the fiscal year reflect a decline of about 37%. Some recovery in earnings is anticipated for the current quarter, but it is not anticipated that earnings will rise to the 1946 level for sometime to come.



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Eye Views Photo Graininess Through 'Fingertip' Touch

THE human eye detects graininess in photographic enlargements of small negatives in much the same way that a fingertip feels the roughness of a textured fabric. This comparison, based on existing physiological information about the motion of the eye, was made by Drs. Lloyd A. Jones and George C. Higgins in reporting their investigation of photographic graininess in Kodak Research Laboratories.

The two scientists said they now believe that the appearance or nonappearance of graininess in a photograph is based primarily upon movement of the image over the eye's sensitive retinal receptors. This movement takes place during the eye's "fixation pauses" lasting no more than two or three seconds.

The Kodak researchers explained that it is well known that in examining an object the eye looks first at one area and then another. During the brief pauses when the different areas are examined, the eye appears motionless. Actually, however, as other researchers have found, during these pauses the eye vibrates rapidly. The central fovea, where vision is sharpest, flicks rapidly over small fields of the object being viewed.

This effect of the eye's vibration during such a "fixation pause," it was pointed out, is much like a finger which feels little while resting on rough cloth but senses texture when moved over the surface. These vibratory movements of the eye subject the retinal nerves to light of varying intensity or an "illuminance change or gradient."

"Gradient sensitivity" is the term which the Kodak researchers have coined for the ability of the eye to detect these "illuminance changes."

Part of the Kodak research technique involves the use of observers who examine magnified images of developed photographic deposits to determine what constitutes "just perceptible" graininess. From their investigations the two scientists now believe that a relatively small group of the eye's retinal receptors—some 1500 cones clustered around the center of the fovea—largely determine the final judgment of visibility or invisibility of graininess. Beyond this central field of the eye, they point out, the ability to see detail falls off rapidly, decreasing by as much as 10 per cent even at the outer edge of a very small central field.

Requisites of Visual System

Through their research and through application of existing knowledge of the human eye, they hope to obtain a correlation between granularity, or the physical properties of the photographic image, and graininess as seen by the eye.

Both Jones and Higgins feel that if granularity measurements are to be of value in predicting graininess, they must be made in a manner consistent with the known methods of functioning of the human visual system. A method of measuring granularity which will correlate closely with the physiological quantity, or graininess, would be valuable to photographic emulsion makers interested in producing less grainy emulsions without sacrificing film speed.

Dickinson of MPA, Passes

Director of the MPA Conservation Department for 20 years, Arthur S. Dickinson died recently at the age of 59, after a long illness, in Santa Monica, Calif. Mr. Dickinson had retired last July from the Association, ending a film career that began in 1921. He joined the MPDA, forerunner of MPA in 1927 in a technical capacity, handling contact with the Society of Motion Picture Engineers, National Film Carriers, Inc., and the National Fire Protection Association.

Born in Chattanooga, Tenn., Mr. Dickinson studied engineering at Georgia Tech and was a member of the Picture Pioneers, the NFPA, former financial vice president of the SMPE and a member of its board of governors.

He is survived by his wife, the former Blanche Lynch, and two daughters.

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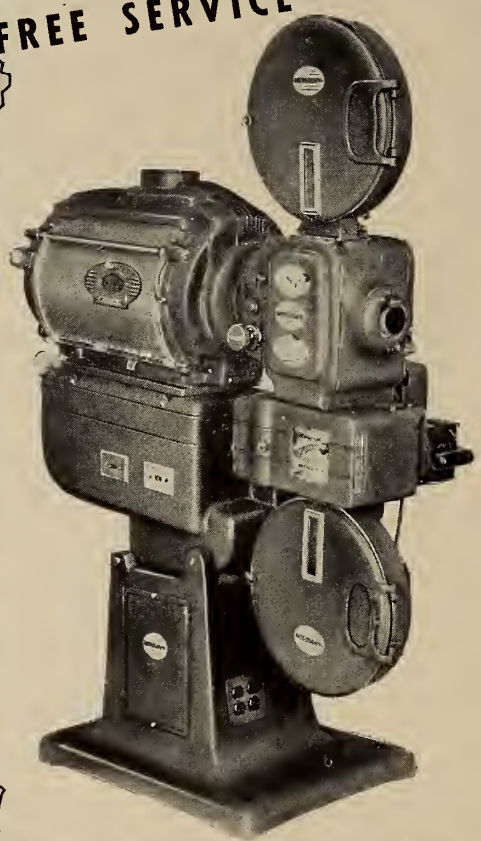
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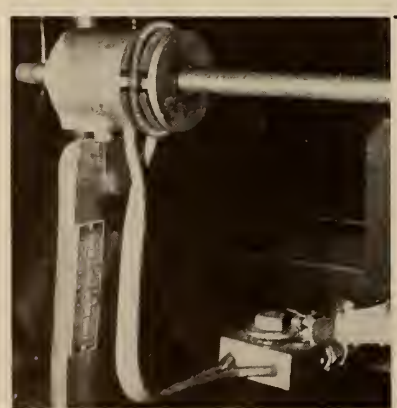
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(*Continued from page* 26)

about three hours, as it is necessary to remove the entire case.

I have made the relay easier to service by mounting it on a Bakelite panel attached to the main terminal strip. I positioned it directly above the control shaft with three inches of the relay above the terminal strip. The heat at this point should not be excessive. It is necessary to run another pair from the 110-volt control contacts and to make a new three-wire cable to run from the terminal strip to the relay. The relay can then be serviced between reels.

As I believe all these relays will eventually give trouble. I think the aforementioned change could well be made on all. Also, it might be wise to have a set of spare contacts.—F. A. Brown, *ALTEC.*

Starting Failure of Delco A-202 Motor

Considerable trouble was experienced with slow starting of the Delco A-202 motor used on Motiographs. The equipment was perfectly free and all mechanical alignment was such that no trouble should be experienced. The condition was satisfactorily corrected by replacing the 100-ohm starting resistor with 50 ohms.—C. T. Hoops, *ALTEC.*

Matched Optics; Lamp Alignment

The improved results we have obtained in a number of theatres verify the importance of matching the speed of the arc lamp reflector with the projector lens speed. Lamp manufacturers usually specify a definite working distance between the reflector and aperture, but unless the lens speed is F:2 or better the working distance must be varied to effect a proper match.

We are convinced beyond doubt that the well-known "pin-hole" aperture method of lamp alignment will not necessarily align any part but *the reflector itself.**

In the event one wishes to align, or check alignment of, the carbon holders, guides, or other lamphouse parts with the projector optical system, use the straight steel rod, or (and much simpler) a stretched string from the center of the full light image marked on the port shutter, back through the projector with lens removed, and on through the carbon holders. Check string for centering in the aperture and reflector opening. —J. A. Webster, *ALTEC.*

Hum From External Light

After trying new aperture plate, with hum still present from Technicolor prints, I finally found trouble to be caused by a reflection from porthole glass to top of 49 amplifier and thence to P. E. C. through hole in front of 1-type sound unit, which is used to give screw driver access to P. E. C. terminal binding post.

Since P. E. C. is sensitive to red light, only Technicolor containing reds, and not black-and-white or new Cinecolor, would give hum. Hum caused by interruption of light by shutter at a rate of 48 times per second. Some fun.—G. H. Hall, *ALTEC.*

Clarifying U Base Lubricant

A useful stunt which aids in clarifying the lubricant in "U" Base drives is to affix a small Alnico magnet bar to the oil drain plugs. The magnet can be held in place with ambroid cement and causes the drain plugs to attract small particles of steel and iron which otherwise would be contained in the lubricant.

The plugs can be removed periodically and any adhering metal particles removed. A wooden plug can be used as a stopper during this process to prevent the grease from draining. (Magnetized drain plugs may also be obtainable at automotive service stations).—A. D. Turnbull, *Dom. Sound Equip. Co., Canada.*

Hum in the 46 Amplifier

In a recent installation of a Voice of the Theatre horn system with a 46-type amplifier, a high 120-cycle hum level was eliminated by replacing the 247-A input transformer with an Altec Lansing A-247-A transformer.

The A-247-A must have an electrostatic shield between primary and secondary, although it does not show on the diagram. Try this where hum level is high. —F. S. Barnes, Jr., *ALTEC.*

* IP concurs, having long decried the well-advertised "pin-hole" as an effective means for lamp alignment, trade paper "experts" to the contrary. The use of a steel rod for this purpose, as advocated by the Projection Practice Committee of the SMPE in 1935, still is the best method.—Ed.

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New Kodak Process Mass-Produces 'Photo-Silver'

A new way of making silver nitrate crystals, keystone of all photography, is announced by Eastman Kodak Co. The improved process pumps the glistening white particles from a tank much as a threshing machine spews forth grain. Replaced is the old and picturesque—but slow—way of producing the crystals by evaporation in open porcelain dishes. Kodak engineers said the new system is a historic step in photographic manufacturing. It throws out a process that had been standard for half a century.

Designed by Kodak before the war, the new system uses machinery that makes the silver nitrate crystals continuously and dries them in a few minutes. Formerly this took several days. After crystallization, the silver nitrate was dried on glass trays in shelves in a warm room.

Use of Silver in Photography

Silver is the stuff that makes modern photography possible. Kodak annually uses some 15,000,000 ounces of it. Today's use of silver in photography stems from discoveries of 16th century alchemists, who were always looking for a way to turn base metals into gold. They failed in that, but they did stumble onto the fact that silver nitrate and other silver compounds "react" or are "sensitive" to light.

Today silver nitrate crystals are combined with other chemicals and gelatin to make photographic "emulsions." These emulsions are light-sensitive layers coated on sheets of transparent material known as "film-base." Emulsion and base together make the "film." When light hits the film, the silver salts change into an invisible "image" that, treated chemically, becomes the photographic "negative."

How the New Process Works

Here is how the new silver nitrate-making process works: First, several chunks of silver are dissolved in nitric acid. These ingots weigh about 75 pounds each and are 99.97% pure silver. The resulting greenish liquid goes into storage tanks. From these tanks the solution is pumped slowly into crystallizers, which are 1,000-gallon stainless steel tanks. In them the liquid is constantly stirred by circulating pumps.

This stirring and the constant addition of fresh silver nitrate solution result in the formation and growth of silver nitrate crystals in the lower part of the tank. Soaking wet and resembling salt, the crystals then are drawn from the tank through a pipe and poured into shiny, perforated, stainless steel baskets. The baskets are whirled so most of the moisture in the crystals is carried off by the spinning action. Each basket contains 60-70 pounds of crystals, worth about $500.

Next the crystals are redissolved in distilled water. Again they go through the same crystallizing steps. After the wet crystals come from the crystallizer the second time and have been whirled until they are only damp, they are dumped into a rotary drying drum. At the other end of the revolving drum the crystals pour out completely dry.

Funneled into stainless steel barrels, each holding $5,000 worth of the product, the dry silver nitrate is trucked to the emulsion makers. They then turn the white crystals into the materials that are the essence of today's photography.

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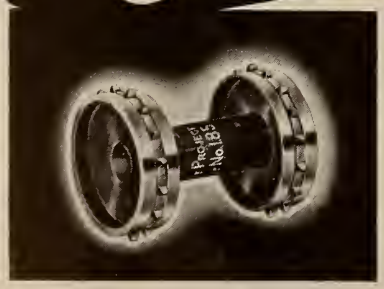
The Ballantyne Company, of Omaha, Nebr., manufacturers of theatre sound and projection equipment, have announced the appointment of K. Streuber & Lachicotte, of New York as exclusive export agents for Royal Sound Master sound systems, SoundMaster bases, Arc-Master lamps and all other products. This transfer of the export department, coupled with prompt delivery should offer attraction to foreign distributors, Ballantyne said.

In addition to their complete line of theatre equipment, the Ballantyne Company has recently added several new items, including the PD-57 dual channel amplifier, a new Arc-Master 40-60 amp high-intensity arc lamp and several new speaker systems.

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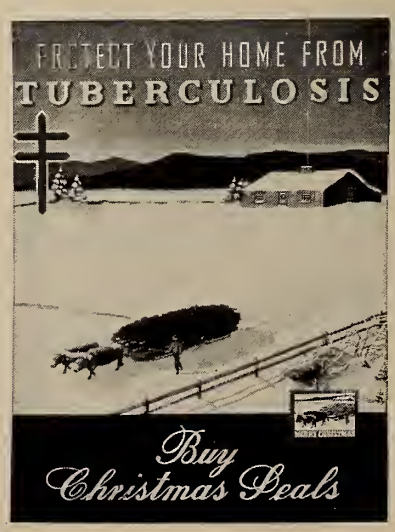
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Addendum: 'Quality' vs. 'Pleasing' Sound Reproduction

STILL another contribution to the now rather extended discussion technical circles of the public preference for "pleasing" as against "quality" sound reproduction is the appended engaging editorial by Will Whitmore, advertising manager of Western Electric Co., as culled from the W. E. publication *Oscillator*.

Readers of IP will recall specific data bearing on this question in these pages.[1] Whitmore's editorial, in part, follows:

It's high time we interred an old story to the effect that the public prefers plenty of bass and no high notes. That might have been true in the early days, but it just isn't true today. And if any manufacturer finds it true of his product, he'd better raise his eyebrows at his equipment rather than at the public's taste in sound. . . .

We have been through this so many times before, the public reaction to improvement in sound can now be charted with almost scientific accuracy. Remember the early days of sound pictures? Certainly no one complained that the quality was too good. The frequency range was narrow and accompanied by quite an assortment of noises and a high over-all noise level. But when such improvements as noiseless recording and wide-range recording and reproduction were introduced, it did take time for the public to become accustomed to better sound. Soon, however, they did become accustomed to it, and no one can be found today who would welcome a return to the earlier quality of sound in motion pictures.

Film Industry a Typical Example

The experience of the motion picture is typical of all phases of sound reproduction. There may be a short time-lag in the popular acceptance of quality sound, but each improvement does become accepted, and when it is, a distinct gain is made—a *net* gain which can never be lost. . . .

Every improvement in sound quality in the past has been accepted by the public and the public is ready for more . . . There have been instances where the public refused to accept what appeared to be increases in the frequency range of sound reproduction. We know now, however, that such failures were due to the fact that so much more noise and, in particular, distortion were added that the public was quite right in refusing to accept this so-called "high quality" sound.

Much has been learned in recent years and tremendous progress has been made in technique and instrumentation. Today high quality sound with noise and distortion reduced to a minimum is possible and practicable. We have the equipment, we know the techniques. We are due to see the whole art of sound reproduction take on new significance, new acceptance and stature. The curtain is rising on a new era in sound.

[1] "'Quality' vs. 'Pleasing' Sound Reproduction," by J. Moir; I.P. for February, 1947 (p. 5) and May, 1947 (p. 16).

New Rotary Rectifier Switch

Incorporated as standard equipment on all KNI-TRON rectifiers, a unique switching arrangement has been developed by Kneisley Electric Company, Toledo, Ohio. Rated at 30 amps, 230 volts, AC, the new design has a diameter of four inches and a length of one inch.

Despite its small size, the new switch contains many desired features, including continuous rotation, insulated dead shaft, replaceable contacts, instant toggling and 9-12 pounds pressure per contact. The polyphase design is adaptable to either Delta or Y connections and features 9/16" square bronze contacts. "Alsimag" internal insulation and a cold molded totally enclosed exterior produce increased mechanical strength. Any switching arrangement can be easily incorporated by a simple change of the cam mechanism, and can operate as a six-pole, eight-position design without difficulty.

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Convincing proof of the equipment manufacturer's change-over preference, is the selection of Strong "*Zipper*" Changeovers as *standard factory equipment* on new "AA" MOTIOGRAPH, new postwar DeVRY, and the new BRENKERT theater projectors. Strong "*Zipper*" Changeovers are available in three models: Strong *Special* (for porthole installation), Strong *Zipper* for sight alone or sound alone, and Strong *Dual-Purpose Zipper* for both *sight and sound.* Essannay Electric Manufacturing Co., 1438 N. Clark, Chicago 10.

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MONTHLY CHAT

(*Continued from page* 3)

atre would be "entirely different." This logical-sounding explanation is subject to a bit of analysis which may render it not so very simple.

But first let's consider this interpolation of spot news events into a regular film program. The Doctor insisted that this offered no serious difficulty, particularly when the exact time of a forthcoming event could be accurately pre-determined. As for those spot happenings which might eventuate, say, midway through a feature film release (let's assume there would be 35 minutes remaining), these could be held back until the feature ended. In any event, a delay of even 35 minutes, said the doctor, would certainly be a vast improvement over even the fastest coverage ever achieved by the movie newsreels.

And so it would. But this department holds that any departure from "the-while-it's-happening" flavor of a spot news event in itself makes of such a telecast only another type of delayed newsreel.

But there's another and infinitely more important consideration. Whether the offering be a spot event, or a "delayed spot event," or a feature production—musical, dramatic, or what have you—our contention is that the home tele broadcasters, confronted with the opportunity of making the most gigantic killing of advertising money ever presented, are going to do just as good a job of programming for piping into a comfortable home as any national or urban syndicate will do for piping into a tele theatre.

As between good stuff in one's own home *for free*, or picking onesself up and *paying* for a program of *comparable entertainment value* at the Gem Theatre on the corner—well, the Doctor didn't answer that one; nor did anybody else.

In the absence of convincing data to the contrary (and we maintain that it has not yet been forthcoming) this department will adhere to its view that home television still constitutes a serious menace to the economic health of the present film theatre box-offices.

New PM Speakers by RCA

Engineered to RMA standards, a new line of standard PM speakers has been announced by the RCA Tube Department. For general replacment and sound system work, the line features high quality cones for "rattle-free" response, powerful Alnico magnets and RCA's moistureproof centering. Included in this line are a 4 x 5-inch speaker, a "controlled resonance" 12-inch speaker and both 2 x 3 and 2 x 6-inch elliptical speakers.

Rated at 12 watts, the 12-inch speaker has a unique filter which automatically filters needle scratch and other high frequency noise and an adjustable voice-coil mount permits cone alignment. The magnet is locked into position at 70 pounds pressure by a special clamping ring, precluding the use of cement.

The 4 x 5-inch RCA speakers are specially designed to meet small radio requirements. The magnet is locked into position with forty pounds pressure and the speakers have a special contour frame which permits mounting in resricted space.



'Tis Folly To Be Wise

Thomas Gray once wrote, "Where ignorance is bliss, 'tis folly to be wise." That has long since been proved a poet's fancy but people even today are prone to accept this notion as the truth. Science has shown that ever increasing knowledge can ease the path of man's existence. Advancements in medicine in the past half-century have increased the life expectancy of the average American from about 45 years of age to 65.

Diseases that once meant almost certain death, today are considered minor illnesses, quickly controlled by miracle medicine and modern techniques of surgery. Many contagious diseases, that once killed millions, are controlled by immunization. Injuries, wounds and infections no longer hold the terror of death for most people. Science has done these things—not ignorance.

Cancer, one of the two greatest killers of Americans, still takes an appalling toll of human life. About 184,000 people in this country are expected to die of cancer in 1947. But science has not failed entirely in reckoning with this disease. With methods already at hand, at least one-third of those who die of cancer could be saved if they abandoned their philosophy that "ignorance is bliss" because cases of cancer, if detected early enough, can be successfully treated, the American Cancer Society points out.

If you want to be safe—if you want to take advantage of the knowledge that science has made possible—there are several things you can do: see your family physician for a frequent check-up, visit your nearest cancer detection clinic and apply for an examination, be alert for "signs" of cancer. Any of the following conditions should be considered suspicious and send you hurrying to your doctor. They might mean that you have early cancer, which is curable, or they might mean nothing at all. You can't take a chance—see your doctor if you notice any of these things:

1) Any sore that does not heal, particularly about the tongue or lips. 2) A painless lump or thickening, especially in the breast, lip or tongue. 3) Irregular bleeding or discharge from any of the natural body openings. 4) Progressive change in the color or size of a wart or mole. 5) Persistent indigestion. 6) Persistent hoarseness, unexplained cough or difficult swallowing. 7) Any radical change in the normal bowel habits.

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DECEMBER 1947

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For once they actually agree!

Hope and Crosby, in the movies, seldom see eye to eye. But there's one thing they really do agree on—they both think U. S. Savings Bonds make wonderful Christmas gifts!

SAYS BOB: "They're swell for *anybody* on your list. You couldn't pick a nicer, more sensible, more welcome present. Even Crosby knows that."

SAYS BING: "I hate to admit it, folks, but Hope is right. And remember this—you can buy Bonds at any bank or post office in the U. S. A."

BOB AND BING (together): "This Christmas, why not give the finest gift of all—U. S. Savings Bonds!"

Give the finest gift of all ... U.S. SAVINGS BONDS

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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 22 DECEMBER 1947 *Number* 12

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MONTHLY CHAT

IN LOOKING back and reviewing the purely technical developments in the motion picture field during the past year, most projectionists would be tempted to make the snap observation that there were few, if any, advances which promise to exert a profound effect upon the future of the art. That such an opinion, seemingly justified by the written record of happenings, would be a grave error is known only to those few who have been privileged to have a look behind the scenes, so to speak, and become familiar with the work now in progress in several developmental laboratories.

Projection has never been a static art down through the years, and certainly not since the sound track was added to the film. Just abut the time the craft is ready to accept the *status quo*, something pops which demands ever closer application to the job by every working projectionist. This corner firmly believes that the next year will witness several important developments, which, while adding to the appeal of the motion picture, will demand an even higher standard of craftsmanship by the men who deliver the finished product to the paying customers.

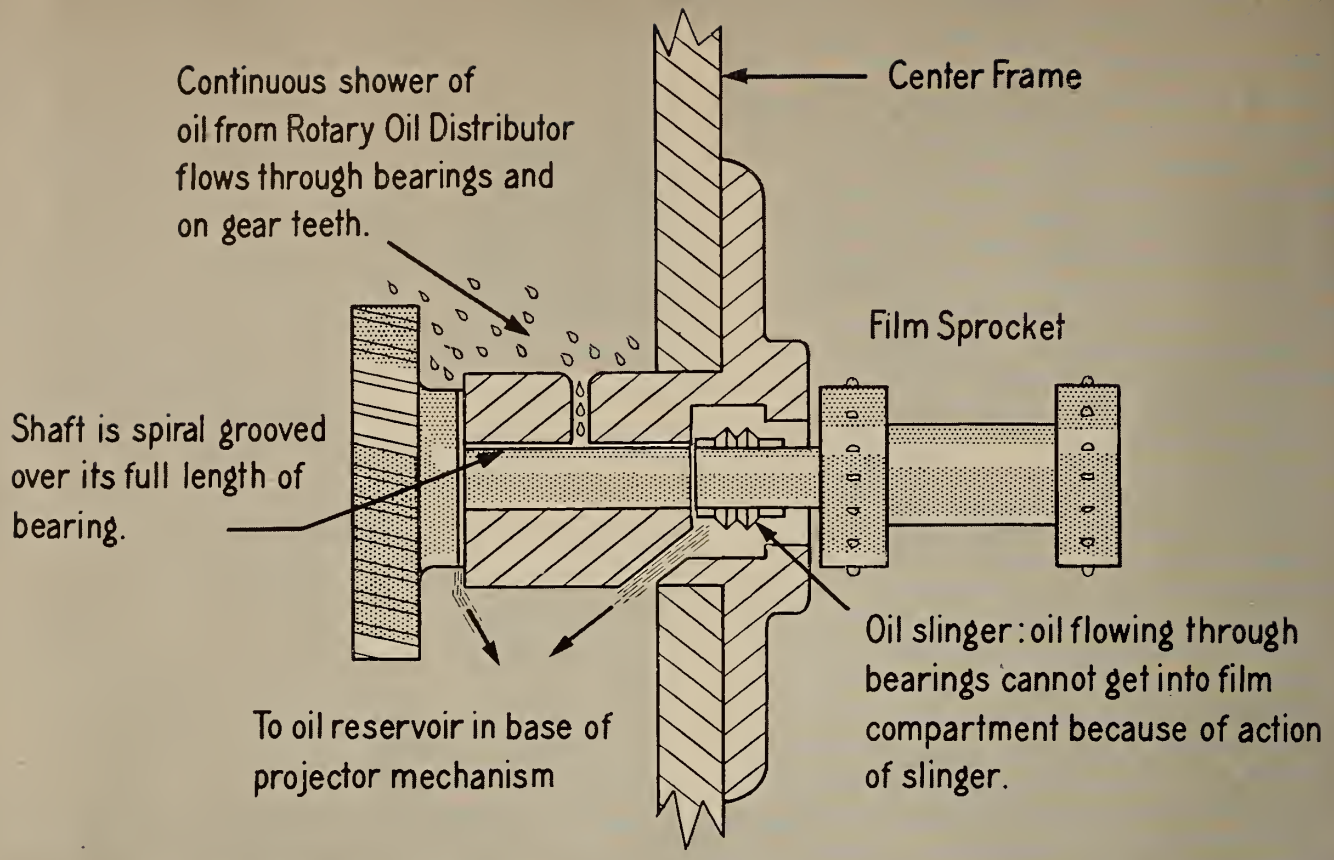
For example, it is now apparent that intensive effort has been extended through the past couple of years, and particularly during 1947, to develop a new projection light source. We do not refer specifically to the cadmium-mercury lamp recently reported on in these pages, but a light source of this type could very well be the answer. Already in use in the studios, this lamp need only be refined and pepped up a bit, particularly in terms of spectral characteristics, in order to provide a projection light source of more than merely acceptable intensity, color and general utility.

In turn, the carbon-arc people, by no means unaware of the feverish efforts of their competitors, have never paused on the job of improving their product. With high-amperage carbons pulling 200 amperes and more already available, and with a new 85-amp Suprex carbon now having passed through the experimental stage, this type of arc may be expected to maintain its pre-eminent place on the list of motion picture illuminants.

Next in the order of importance is stereophonic sound, at least two experimental systems of which have already been tested to the complete satisfaction of their sponsors. In fact, such systems have been available for many months now but have been held back in deference to the jittery state of mind of the top film people. If box-office takes hold up during the coming year, and if the world motion picture market can be stabilized in terms of a better deal for American films, stereophonic systems, at least on a limited scale, are a certainty for 1948.

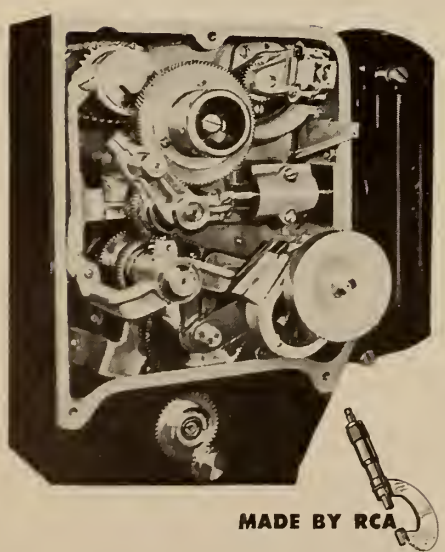
So good a job have the optical gentlemen done during the past year that we

(*Continued on page* 38)



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The gear side of the Brenkert "80" mechanism with cover removed. All parts are lubricated in a bath of oil *continuously and automatically*. Wear is negligible even after many years of operation.

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A geared pump inside the housing delivers a continuous flow of oil through a large copper pipe from the reservoir at the base of the main frame casting to a rotary oil distributor at the top of the gear train. This rotary oil distributor is perforated in such a way that the various holes are in line with each gear and bearing in the gear train. When in operation, oil is pumped from the reservoir to the rotary oil distributor and then showered over all moving parts.

All shafts are spiral grooved the entire length of the bearings. Thus oil is forced along the entire length of the bearings continuously and drains back into the reservoir. A full pint of oil is used in each Brenkert Projector. This oil circulates continuously throughout the projector, including the intermittent mechanism. Consequently, if any particular part of the projector becomes overheated, this excess heat will be carried away by the circulating oil which acts as a cooling system as well as the lubricating system.

Brenkert's positive method of continuous lubrication provides each projector with the right kind of lubrication, at the right time and in the right place. This means longer lasting high-quality performance, longer wearing of all parts low upkeep cost. Since all lubrication is *internal,* oil cannot get into the film compartment or sound-head. In the Brenkert Projector the oil is kept in, and foreign dirt is kept out. This means that the film is kept clean and free from oil so that the projected picture is much clearer and the sound is free from distortion.

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INTERNATIONAL PROJECTIONIST

VOLUME XXII DECEMBER 1947 NUMBER 12

The Peerless Hy-Candescent Arc Lamp

Light Heat Filter Unit and Water-Cooled Positive Contacts Described

By HENRY B. SELLWOOD

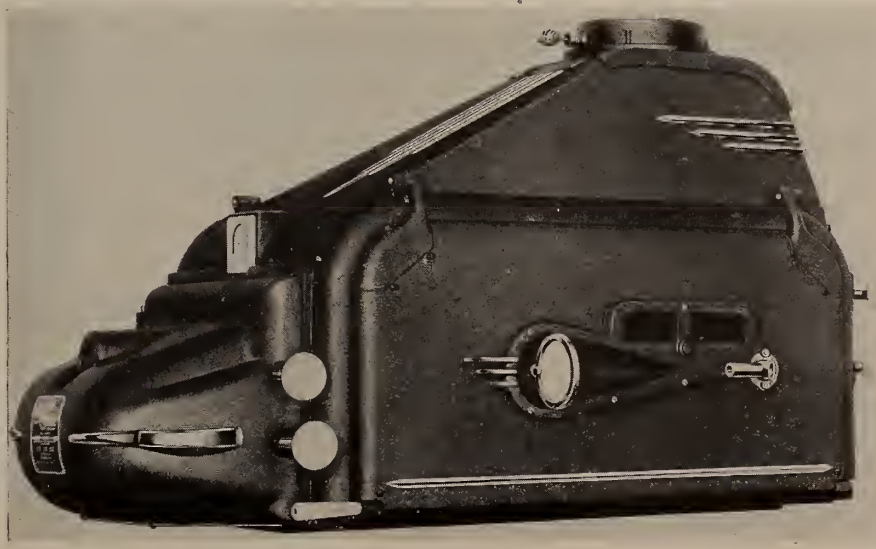
EMPHASIZING the general trend toward higher carbon-arc currents, with its concomitant of much larger lamphouses and other constructional and operational features designed expressly for such purposes, is the super-high-intensity carbon-arc lamp produced by J. E. McAuley Mfg. Co. and exhibited at the recent SMPE convention in New York City.

Primary consideration in the design of this lamp was given to overcoming the problems posed by the intense heat generated by the arc when operated at currents ranging up to 200 amperes. Requisite for this type of operation is a large lamphouse, excellent ventilation, proper positioning of the mechanism so as to be subjected to the very minimum of arc heat and ash, and fine optics.

This new Peerless Hy-Candescent lamp appears to satisfy these requisites. In addition, there is available for very high-amperage operation an ingenious water-cooled positive contact assembly which, already operating in many de-luxe theatres and drive-ins, has demonstrated a high degree of efficiency.

The Hy-Candescent lamp is, in inches, 49 long, 22 wide and 29 high. An oversize 8-inch chimney base is used. Normal air intake is accomplished by a large opening in the bottom of the rear door cover and through the light cone at the front. Also, there is connected to the arc feed motor a blower which itself supplies 60 c. f. m. of air over the entire base of the arc burner mechanism.

Peerless Hy-Candescent carbon-arc lamp, 180-amp and over capacity.



The lamphouse is formed of sheet steel of heavy guage. The doors are 1½ inches thick, double-walled, on the inside of each of which opposite the arc, is a slideably-mounted steel heat baffle plate. These removable baffle plates have three thicknesses of metal with two air spaces to heat-insulate the outside surfaces of the doors.

Condenser Lens Mounting

A second casting slideably-mounted to the housing front casting serves as the light cone and as support for the condenser lens mount. Manual adjustment both vertically and laterally is easily accomplished by conveniently positioned control knobs. Condenser lenses may be aligned to the optical axis of the projector independent of the housing proper.

Mounted on the same casting is the condenser support cradle having means thereon for focusing the condensers. The rear dowser is pivoted below and left of the optical center, and when open swings upward and left of the condenser, thus being completely out of the path of the arc tail flame.

A standout feature of the Hy-Candescent lamp is the method of lens mounting. The condenser mount casting has several narrow machined prongs into which the rear lens fits and which are the only lens contact points. A sheet metal separator ring has several thin sheet steel radial webs which contact

the curved surface of the rear and front lens. Correct spacing of these curved surfaces is assured irrespective of any variation in thickness of the edges of the lenses. Both lenses and separator are so held in place and in proper alignment as to permit use of the full aperture of both condenser lenses.

Two arc viewing ports are provided on the right-side lamphouse door, the front one for direct arc viewing and the rear one for observing the mechanism and noting carbon length. An arc imager is provided which, visible from both the front and rear of the lamphouse, may be adjusted independent of the lamphouse angle. The left-side door has a single viewing port.

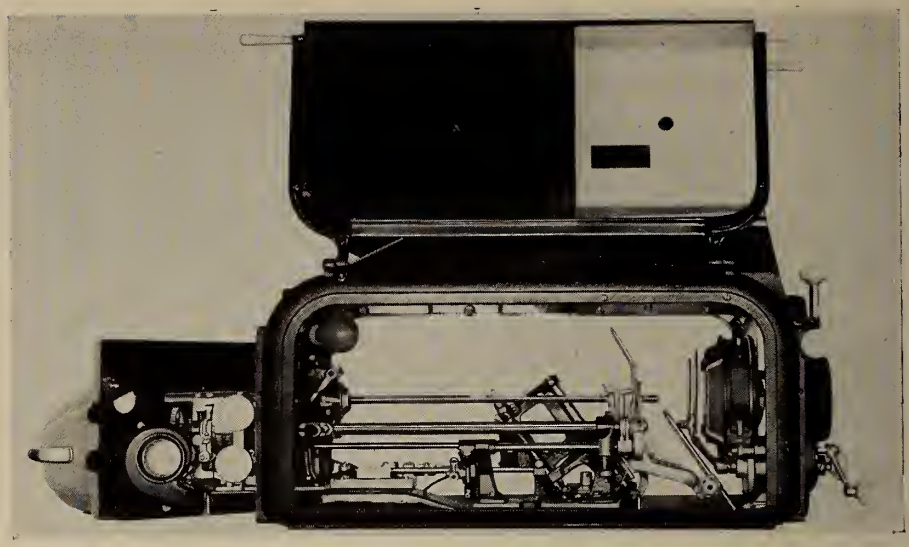
Arc Burner Mechanism

Unit construction marks the arc burner mechanism, including the feed mechanism, blower unit and motor. Secured by only one screw at the rear of the housing and a threaded stud at the front, this unit is readily removable.

Hardened and ground overriding clutches permit a wide range of feeding speed for both carbons. A constant speed motor operates at its maximum torque at all times, thus obviating the need for a control rheostat in the motor circuit. The positive carbon rotates at a constant speed of 18 r.p.m., regardless of the rate of feed.

The positive carbon feeding rate may be varied from zero to 35 inches per hour, while the negative feed range extends from zero to 8 inches per hour, thus providing ample reserve for all types of h. i. carbons.

One setting provides for a full 22-inch positive carbon, while 4¾ inches of the 9-inch negative may be fed at one setting and thus last for the burning of a full positive carbon. Manual controls for arc adjustment are conveniently provided. The entire burner mechanism may be adjusted either vertically or laterally so as to accurately position the positive carbon crater in the optical axis of the projector.



Interior view of Peerless Hy-Candescent arc lamp, viewed from operating side, showing burner element and, at rear, operating mechanism.

The positive carriage follow pin may be manually disengaged from the feed screw, easily and quickly, thus permitting rapid hand movement of the carriage to facilitate arc trimming. The rear end of the positive carbon is clamped to the rotating mechanism by a spring-operated collet, which is instantly released by simply throwing a lever.

Positive Carbon Guides, Contacts

The positive carbon guide is a nickel casting having a circular hole a little larger than the carbon and is located just back of the positive contacts. Two machined pads on the contacts force the carbons to the bottom of this circular hole, thus keeping the carbon constantly in a fixed central position.

Pure nickel is used for the floating positive carbon contacts. The adjustable contact pressure spring is located well back from the heat of the arc, and a cam, operated by a special trimming wrench, is provided to spread the contact pressure arms to enable easy insertion of carbons. The rotation of this cam to its limit overcomes the spring pressure and both contacts may be lifted out for cleaning or replacement.

Three non-magnetic heat baffles spaced ⅛ inch apart are employed ahead of the positive contacts. Held in position in machined grooves by gravity, these baffles are easily removable for inspection or cleaning. The front baffle is a special alloy that is practically impervious to arc heat and gases.

The most thorough degree of insulation possible is used for the entire positive carriage, as well as for the baffles, contact spring arm, etc., at the front end of the burner to insure that current reaches the carbon only through the contact, *not* by means of by-passing through any other burner part.

A permanent magnet of cast No. 6 Alnico is used to insure correct arc stabilization. The magnet support bracket may be mounted to either the front or rear face of the right front tube support casting of the burner, thus enabling a change of 1 3/16 inch in the distance between magnet and arc. For operation within the 120-140 amp range the most rearward position is desirable; while for higher currents up to 180 amperes the forward position is recommended.

Negative Carriage Positioning

To eliminate the ill effects of the intense heat of the arc the negative carbon carriage has been placed well to the rear and to the left of the arc. This is a radical departure from the conventional positioning of this carriage directly beneath the arc. So low is the temperature at the new location that ordinary lubricating oil may be used without carbonizing.

The negative carbon is at an angle of 55 degrees relative to the positive car-

(*Continued on page 24*)

INTERNATIONAL PROJECTIONIST

extends to all its friends

the

Season's Greetings





He makes the camera concentrate on her...

NOT by chance is this escaping beauty the center of attention!

Before the scene was shot, the assistant cameraman made very sure she would be. He kept background and foreground from stealing her scene . . . made the camera concentrate on her and her alone.

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Assistant International President

Reflected Light Method for Interior Sets

New Process of Studio Cameraman Avoids 'Arty' Soft-Focus Effect and Aids Projection of Low-Key Interior Scenes

DARK interior scenes, ever the despair of projectionists in their effort to project a well-lighted screen image, may well cease to be a major motion picture technical problem when a system of reflected light developed recently by Cameraman George Folsey is brought to its peak efficiency. Used sparingly in "Green Dolphin Street," and more latterly in "If Winter Comes," the Folsey system is described by Walter R. Greene in the October issue of *American Cinematographer*.

Interior dark sets with one or more "dark sides" have often been subjected to ordinary hard direct lighting, but the over-all result of this method is to produce scenes that are entirely too contrasty, in addition to imposing a serious limitation on the actors' freedom of movement.

So, instead of regulation lighting, with players bathed in direct light from arcs and inkies, Folsey used large white silk sheets and projected the lights onto these sheets for reflection onto the set. As a result, the actors, their clothes and the set were all immersed in one enveloping, soft, directional light.

Not 'Arty' Soft-Focus Type

Folsey asserts that his method may be by no means compared with the "arty" type of soft-focus lighting which has rendered many otherwise fine feature releases an exceptional problem on the projection end. While his process reduces materially the harshnesss of present direct lighting, it does provide a sufficiently high level of light over the entire picture area. Folsey points out that the idea is based on the north-light source used so successfully in painters' studios.

The principle is that of an evenly-distributed soft light played on the scene from reflectors rather than from a direct source (see photos). The light of a large arc is directed onto an off-set white silk sheet set at the proper angle to reflect the light onto the set as desired. This method allows for light control so that the spectator feels that the light comes through the windows and doors, rather than from a source inside the set itself.

Round, Rich Light Over-all

Silk reflectors were used for only one reason, Folsey pointed out, and that was because such material was available. However, he stated, any white material that will reflect light can be successfully utilized. At times the silk reflectors were provided with white cardboard backings to give a greater amount of reflected light.

The size of the silk reflectors varies. Two 12 x 12 feet sheets and one round silk butterfly reflector were used, in addition to smaller ones to "kick" light into portions of the set where specifically required. Incidentally, occasionally for a definite purpose the light was projected *through* the silk rather than reflected from it. On closeups a 150-amp light source was used, reflected from silk diffusers.

Reflected light provides a soft, luminous quality through filtering the original light source. Such a light is not flat; it's round and rich in over-all quality and can be controlled on any black, white or grey set; in hallways or other confined quarters.

Interiors shot with reflected light seem to have a more natural appearance; but of the utmost importance is the fact that actors are allowed more freedom of movement within the set. They can more readily turn from one side to another without the hazards to a cameraman attendant upon such changing positions when direct lighting is employed.

Effect of Reflected Lighting

The photographer is always able to have a round light on the actors in any positions on the set—which does not apply with regulation lighting. This is a particular advantage when large groups of people are in a scene; but the same excellent results are obtained for single or duo groupings.

There seem to be few restrictions of movement in "panning" or dollying when reflected light is used. However, there are some. A "pan" in a complete circle is obviously impossible, as it is always better to leave the front end of the set available for the light to be reflected from. Admitting the existence of a few

Cameraman Folsey in three different poses adjusting the silks for scenes shot with new reflected light method. At right, arc light projected onto the silk reflector and into the set, clearly demonstrates the technique for boosting interior set lights.



Projection Data Charts

By ROBERT ALLEN MITCHELL

Addenda to Data Forms 1 A and 1 B

The publication of these addenda concludes this series of seven articles. This series was noteworthy for, among other things, the fact that it was conceived and executed by a projectionist working daily at his trade, that it represents the most comprehensive effort of its kind, and it affords the craft the first real working basis for cataloguing every unit of equipment used in the sight-sound projection process.

HERE are a few additional electrical formulae that the projectionist may find useful in connection with carbon arc circuits. To determine the resultant voltage of d.c. generators or rectifiers connected in series:

RULE: *To find the total voltage of series-connected current sources,* add the voltage outputs of the separate current sources.

FORMULA: e_1, e_2, etc are the separate voltages):

$$E\ e_1 + e_2 + e_3 + \ldots e_n$$

To determine the resultant voltage of d.c. generators or rectifiers connected in parallel (shunt):

RULE: *To find the total voltage of shunt-connected current sources,* add the voltage outputs of the separate current sources. Divide the sum by the number of current sources.

FORMULA (e_1, e_2, etc., are the separate voltages; n is the number of generators or rectifiers):

$$E = \frac{e_1 + e_2 + e_3 + \ldots e_n}{n}$$

To determine the resultant available amperage of direct-current generators or rectifiers connected in series:

RULE: *To find the total available amperage of series-connected current sources* add the available amperages of the separate current sources. Divide by the number of current sources.

FORMULA (i_1, i_2, *etc.*, are the separate available amperages; n is the number of generators or rectifiers):

$$I = \frac{i_1 + i_2 + i_3 + \ldots i_n}{n}$$

To determine the resultant available amperage of direct-current generators or rectifiers connected in parallel (shunt):

RULE: *To find the total available amperage of shunt-connected current sources* add the available amperages of the separate current sources.

FORMULA (i_1, i_2, etc. are the separate available amperages):

$$I = i_1 + i_2 + i_3 + \ldots i_n$$

To determine the resultant resistance in ohms of resistance units connected in series:

RULE: *To find the total ohmic resistance of resistance units connected in series* add the ohmic resistances of the separate resistance units.

FORMULA (r_1, r_2, etc. are the separate resistances):

$$R = r_1 + r_2 + r_3 + \ldots r_n$$

To determine the resultant resistance in ohms of resistance units connected in parallel (shunt):

RULE: *To find the total ohmic resistance of resistance units connected in shunt* divide 1 by each resistance. Add the quotients. Divide 1 by the sum so obtained.

FORMULA (r_1, r_2, etc. are the separate resistances):

$$R = \frac{1}{\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} + \ldots \frac{1}{r_n}}$$

To determine the horsepower corresponding to electrical power:

RULE: *To find horsepower* multiply volts by amperes by 0.00134.

FORMULA (E represents volts: I represents amperes):

$$H.P. = 0.00134\ EI$$

ADDENDA TO DATA FORM 6

Appended are a few additional formulae in connection with projection and screen data. To determine the change of brightness of a picture with a change of throw, the lamps and lenses remaining the same:

RULE: *To find picture-brightness change with a change of throw* divide

(Continued on page 27)

---

restrictions at the moment, Folsey feels most of them can eventually be overcome.

John Arnold, head of the M-G-M camera department, describes the effect of reflected lighting as "comparable to the latest practices in fluorescent lighting."

Whatever measure of success is achieved with the Folsey method, by himself and others, during the coming months, projectionists have cause for satisfaction in the knowledge that there should be a definite improvement in the theatre screen image of interiors.

Several years ago the screen image suffered by reason of the widespread use by cameramen of the "arty" type of soft-focus lighting which was supposed to invest a given sequence with "mood" and so-called artistic appeal. The "mood" induced by such camerawork on the reproduction end was the feeling of anger and frustration on the part of projectionists, most of whom felt that the pictures were all being shot during a dense fog.

Print Density Blamed

Cameramen were quick to pass the buck anent these projection difficulties to the laboratories, the story being that sloppy lab work in terms of incorrect print density not only was riling projectionists but was actually ruining those photographic effects which were achieved only after careful planning and much arduous work in setting up the lighting units on a set. Wherever the fault lay, it is a fact that even in the de luxe theatres high-intensity arcs pulling 130 amps and more were unable to penetrate the murk that seemed to envelop the screen image.

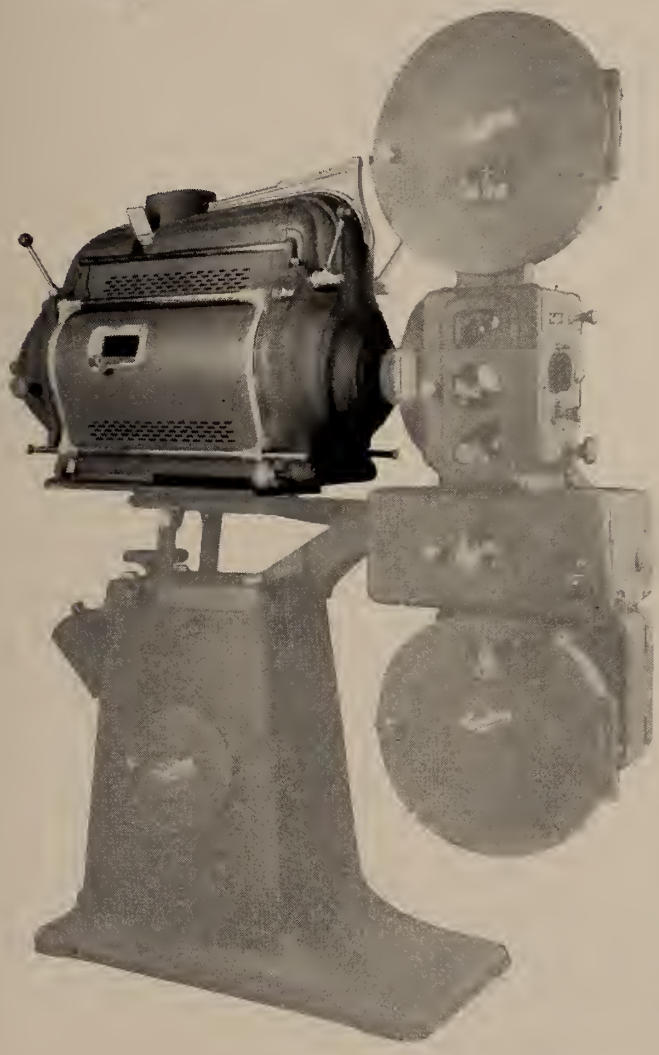
Another pet peeve of projectionists was the sloppy work exhibited by certain color picture, produced by processes which are of comparatively recent development. Whether these faults may be ascribed to inefficient set lighting or to a lack of control in the printing process is not known; but projectionists recall such releases with a shudder.

All color processes have improved greatly over the past couple years, particularly in the laboratory work, and today many color films are better lighted than some black-and-white pictures which are turned out by certain cinematographers who seem not to be aware as yet that the vogue for low-key set lighting has long since passed.

Projection people do not insist that the entire picture area be brilliantly lighted, and they admit the justification for gradations of light that will definitely enhance the mood of a certain sequence. They do insist, however, and rightly so, that the characters and vital elements of a set be so lighted as to be visible when projected by a high-intensity light source.

New Strong 70-Ampere Lamp Challenges Comparison With Any, Including 140-Ampere Condenser Type

Challenging comparison with any high intensity lamphouse whatsoever, specifically including the ultra-powerful con- dens- types u- the larges-



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EUGENE J. ATKINSON

Business Manager



Film Trade Unions in Finland

For the notes which formed the basis of this article IP is indebted to Leo Hilden, Manager, Kansan Elokuva Oy in Helsinki, Finland.

IT IS only within the past several years that the organized theatrical crafts in America has become aware of the existence of similar groupings of movie technicians in other parts of the world and especially in the non-English-speaking countries. Considering its own 54-year history, the I.A.T.S.E. has operated in what amounted to a vacuum in terms of interest in or cooperation with their brother craftsmen elsewhere.

The recent tremendous expansion in the application of the motion picture in many fields other than that of entertainment, plus the ascendency of Labor parties in politics, have served to focus attention on the many organizations of film technicians throughout the globe.

Not only in England where the extremely capable Tom O'Brien has welded together a powerful combine of theatrical workers, and in Australia where the entertainment crafts have long enjoyed such success. but also in France, in Mexico, in South Africa and, particularly, in the Scandinavian countries have show business workers banded together to improve their economic lot and to attain a higher degree of technical proficiency.

Finland the Courageous

IP readers will undoubtedly be surprised to learn that even in so small a country as Finland the amusement workers have achieved a state of unity that shames many countries many times the size of this courageous little nation.

As long ago as 1917 the Finnish amusement workers embraced unionism of a brand which has endured through all the intervening years of wars, hunger and economic crises. Oddly enough, these workers were first organized as a branch of the Commercial and Office Employees Federation of Finland, commonly referred to in Finnish as the SLTL.

The going was really tough at the start because Finland was sorely beset economically, theatres were few, wages were ludicrously low and working conditions were wretched. In 1918, at the close of World War I, civil war broke out in Finland and its natural concomitant was to practically strangle the amusement business.

But with characteristic courage a small group of Finnish film people maintained contact with one another, biding their time for the day when another union could be formed. The plunge was taken in 1930 when the Federation of Projectionists was formed. Electing to go along on its own, this organization affiliated with no strong central body and therefore was able to muster almost no backing for its program.

Ten years elapsed before such affiliation was decided upon, the result of which was the organizing of the Federation of Cinema Employees as an adjunct of the old SLTL. The Federation consists of two branches—one for projectionists, the other for general theatre employees which includes cashiers, porters, charwomen, exchange workers, and office people. In the cities each branch operates autonomously, but in the rural areas both branches are joined in one section, much in the same fashion as the I.A. mixed locals.

Peon Wages, Work Conditions

This new organization had tough sledding at the outset because of the widely varying wage scales and working conditions imposed by the employers' previously unrestricted activities. Competition for jobs was keen, which provided a field day for the employers. The Federation terminated this economic picnic by instituting a rigid classification system of four groups of theatres for each of which was established a basic wage for each employee. Illustrating the power of organization, wage scales immediately jumped 50% over their previous levels.

Prior to this move by the Federation the employers demanded and usually obtained from a browbeaten projectionist, for example, extra work such as transporting film, machine repairing, wiring jobs and such other assorted chores as they elected to assign—all without extra compensation!

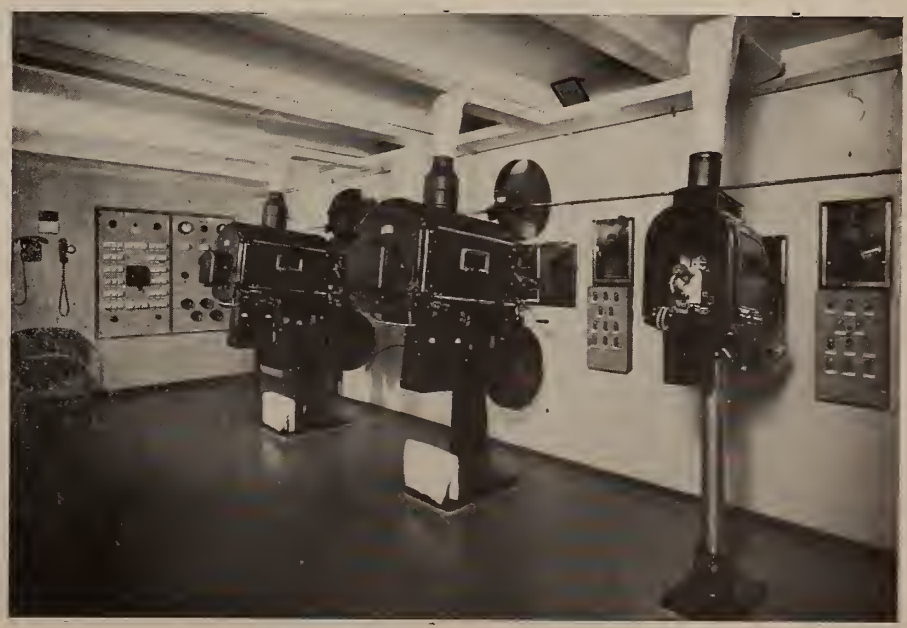
The Federation stopped all this. Now a worker does only that work for which he is specifically hired and paid for. and all extra time put in on a certain class of work is charged for at overtime rates. Projectionist wages, for example, have been raised from an average of $18-32 to the present level of $45-52—without overtime. Moreover, the dream of projectionists for one day off weekly has now been realized, and at least every seventh such off-day must be a Sunday.

Recognizing the fact that it has something more important to sell than straight labor, the Federation set about insuring that its members attain a degree of competency that would make for better worker-employer relations. To this end a system of apprenticeship, examination and licensing was introduced.

The pre-Federation apprenticeship period was predicated on a time basis of one year. Thus, the projectionists in the cities, working an average of five hours daily, would accumulate more than 1500 hours experience in a year; while the man working on the very limited rural schedule would be hard pressed to accumulate 500 hours in the same period. The limited experience of the latter group became all too apparent when they appeared for the two-week training and

TYPICAL EXAMPLE OF A PROJECTION ROOM AND EQUIPMENT IN SCANDINAVIA

In common with almost all theatres in Scandinavia, this projection room in the Kino Adlon, Helsinki, is noted for extreme spaciousness, cleanliness, and neat, compact installation of all units. Two air-cooled projectors and a stereo, all by Zeiss Ikon, are shown. Note arc imagers above vent duct. All theatre lighting controlled from this room. Projection chief Ossi, considered tops in Finland, was not available when this picture was taken.



examination course conducted by the Federation—the city fellows with many extra hours experience demonstrated their great superiority.

Stable Apprenticeship, Wage

The Federation ended this inequitous situation by requiring a minimum of 2000 *hours* actual projection work, irrespective of the time in which it was performed. Thus, all projectionists now come up for examination on practically an even footing, the general level of competency has been raised, and the employers are appreciative.

Incidentally, the Federation's present one month training course costs each man $15, the exam fee is $3, and the license costs 65 cents.

As in other Scandinavian countries, urban theatres in Finland are open for only two performances, both at night, for five days weekly, with an extra afternoon show on Saturdays and Sundays. Seats are reserved in advance, with the latecomers having to take pot luck. In the rural areas there are usually only four shows over the week-end.

Because of the comparatively short working day for Finnish projectionists, many of them indulge in outside pursuits, with mechanical and electrical work being the most popular. Show business being the same the world over in terms of working for other people's amusement, union meetings are held either very late at night or in the mornings.

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

X

THE American trade union movement, as the years passed, developed a form of organization closely patterned upon the structure of government implied in the Declaration of Independence, in its representative character of constitution making and enforcement by officials elected by the members, in the final determination of all questions of law, policy and procedure by the membership itself, the American trade union movement so closely follows the application of American institutions that no marked divergence can be found.

For many years American trade unions were composed of craftsmen, each local union being an independent organization functioning without affiliation with any other union of the same craft. A local connection was maintained between some of these through correspondence. As one result of this rather indefinite contact there was born the germ of federation, resulting about the period of the war with Mexico in the organizing of national unions, with which the existing local unions, or a majority, affiliated.

Shortly before the Civil War some of these national unions had become definite factors in establishing better and more uniform terms of employment.

First International Union

In 1859 the first international union came into existence when four local unions of iron molders in Ontario, Canada, applied for, and were taken into affiliation by the Iron Molders Union of North America, which then became the International Molders Union of North America.

Shortly thereafter several other Canadian unions of craftsmen affiliated with national unions in the United States. International unionism in America became well established before the Civil War came to a close.

This far-reaching development within the trade union movement is significant in the broadest sense. No such international trade union movement has developed elsewhere.

In Canada and the United States the members of the same craft or occupation are united in the same international union. They have a common constitution and by-laws, the same international officers, the same common treasury. Their delegates sit in the national conventions of their organization with equal rights.

So far as their craft interests are concerned, there is no national boundary line separating them. All this has been accomplished and maintained for over 80 years without in any manner modifying the Canadians' and the Americans' outstanding and unflagging loyalty to their respective countries. In fact, it has helped to make better citizens of both, and to develop a bond between the two countries such as cannot be found elsewhere between nations.

The necessity for a working bond between the national and international unions was recognized by trade union leaders before the Civil War, but it was not until 1867 that the National Labor Union was formed, the first federation of labor.

In some respects it resembled the American Federation of Labor, which came into being later. There were some differences in matters of policy, but nevertheless the National Labor Union was the forerunner of the A. F. of L.

Before the Civil War, as early as the 1820s indeed, the unions had experimented politically, to learn before the

(*Continued on page* 28)

Season's Greetings

PROJECTIONISTS LOCAL NO. 173

I. A. T. S. E.

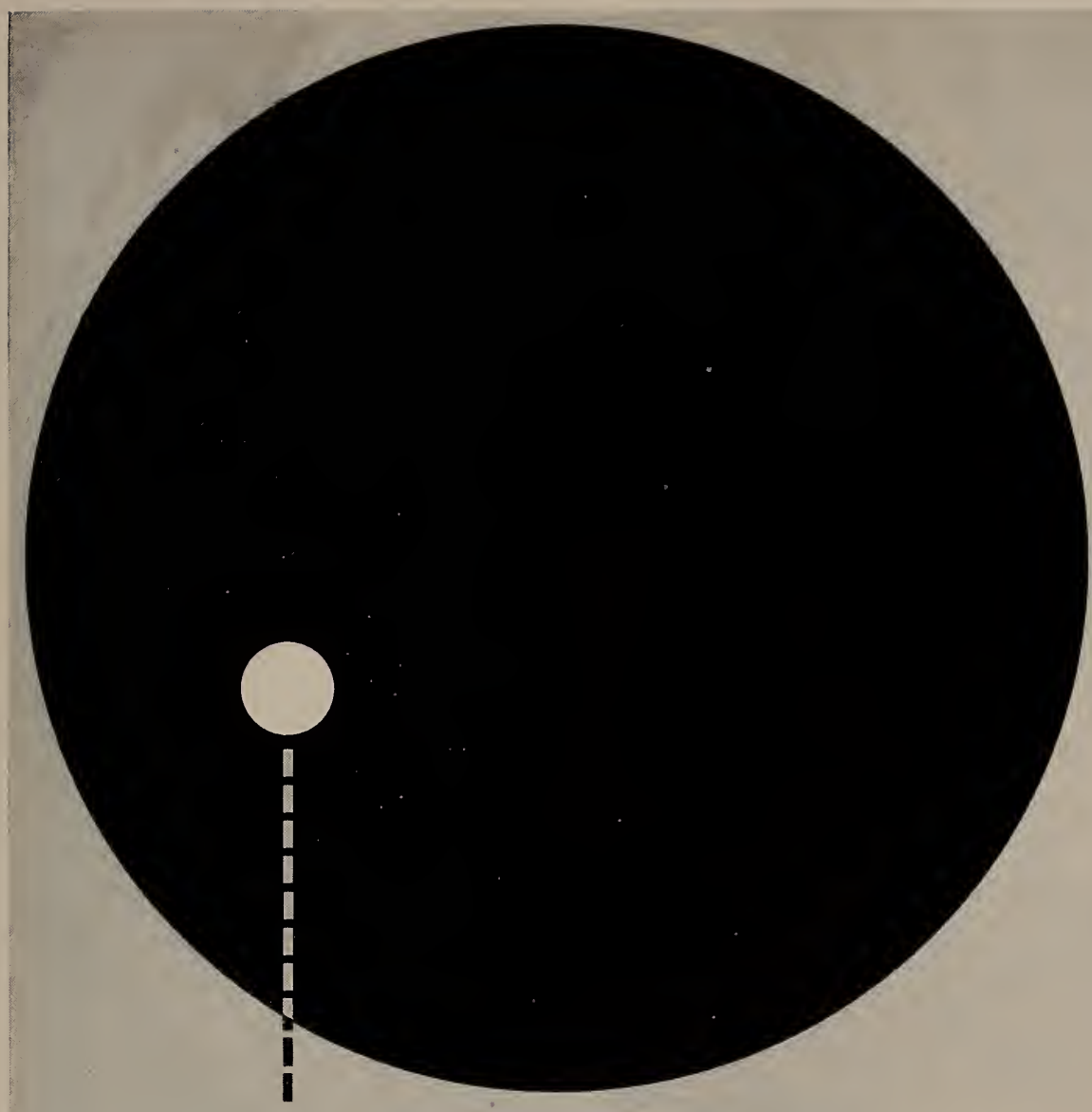
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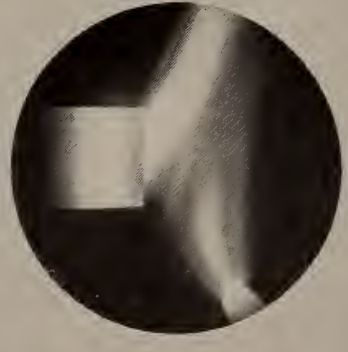
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"THERE'S A BRANCH NEAR YOU"

Startling Soviet Stereo Films

Giant strides forward made by Ivanov since first showing of experimental depth motion picture process in 1940. Forecast for immediate future of process.

Correspondent for "Sight & Sound" (published by British Film Institute) renders an eyewitness account of thrilling Soviet three-dimensional film.

EVER since the days of the ordinary, primitive "still picture" stereoscope technical workers in the cinematic art have sought to apply the principles employed in this simple apparatus to impart the same effect to motion pictures. But while the stereo of hallowed memory plainly indicated the road that must be travelled before success could be achieved, it clung tenaciously to its basic secrets by failing to signpost the tortuous twistings and turnings of the course.

This is not to say that there have not been motion pictures which embodied the three-dimensional effect—some by accident, some by design. Thirty and more years ago the film *Cabiria*, employing the well-known technique of a moving camera and a moving object, attained in several sequences a true three-dimensional effect. But the requsites underlying the duplication of this effect at will remained a total secret to the art.

Novel Effect Achieved With Analyzers

Then there were the more recent *Audioscopics* series of shorts, made by Jack Norling and released by M-G-M, which required the viewer to wear an analyzer in the form of special spectacles. Other inventors suggested



Screen used by Ivanov in 1940 experiments had 30,000 fine copper wires, and weighed six tons.

colored glasses (red and green) or "crossed" polarizing filters, but these do not produce the desired effect. Three-dimensional advertising stills are commonplace, of course, these being produced by a camera which travels on a track for 180 degrees around the object being shot.

In view of the many fantastic, even larcenous, claims advanced by "inventors" of stereoscopic motion pictures through the years, one may not be criticized for the

(Continued on following page)

THE cinema is a former concert hall seating about 220. As in all Soviet cinemas, performances are not continuous: all seats are booked in advance, and one waits in the foyer until the previous house has come out.

As the house lights go down, a voice on a loudspeaker calls for attention and advises you not to move your head from side to side once the show has started. As a result of this advice, everyone begins peering sideways and inclining their heads to see what happens.

What happens is that a kind of rising-sun effect appears to fill the screen, raying out from the center bottom and disappearing as soon as you restore your head to its normal position. Otherwise, there is only a slight discomfort as if there were something in front of your eyes—gauze, perhaps, or as in those curious focus tests used by some oculists with a visible but non-existent line moving over a page.

Normal eyes, I suppose, could stand this indefinitely, but I doubt if mine would have been happy after much more than the hour and a quarter of stereoscopic film in its present stage of development.

No Viewing Aid of Any Kind Required

The screen, which is made, I was told, of millions of chips of glass, looks like any ordinary screen, though it is pitched high. Occasionally something like a sound track was visible on the left side. *We used no special lenses or apparatus of any kind* (italics IP's).

The story was *Robinson Crusoe*. It was only when Crusoe . . . throws a rope to a drowning sailor that you get your first shock. The rope comes hurtling and curling right out of the screen into the darkness over your head. At you! You duck. We all did. After that you are ready for anything. . . .

You soon accept the new screen convention of Crusoe's personal *roundness* and take it for granted. Other chances must be taken to keep the new idiom alive. They come from the animals which Crusoe encounters. Each is startlingly real; and when a civet cat crawls out on a branch *over the auditorium* (italics IP's), our delight is unbounded. . . . Advantage is continually taken of shooting (camera) through foreframes of ropes or branches or the archway of a tree.

Sometimes the foreground itself comes alive. As Crusoe advances down a corridor of undergrowth, the camera tracks backward in front of him. Out in the auditorium, about three rows in front of you, leaves and flowers materialize in the air, dangle and dance, and float away into Crusoe's face. Small birds sit on them, or fly out at you from the screen and vanish *over your head;* or

form themselves out of nothing into a cluster of wings in the darkness. Their musical chattering is also in the air all round you, and there is no need here as in an ordinary cinema to adjust this depth of sound to the flat convention on the screen several yards away.

Illusion of Depth, Immediacy Pronounced

Personally, I am allergic to spiders. I was nauseated by an immense brute as real as life and half as large as the screen within what appeared to be a hand's grasp of my nose!

Darker scenes are apt to be blurred. But the lighter scenes are brilliant, though lighting seems to be as tricky as for color films. There are no dissolves: a scene is ended with a fade or, for passage of time, a wipe.

The depth is used cleverly to increase our sense of Crusoe's loneliness. We hear him talking to his dog after a storm (and what a storm! wind became visible!) . . . Our sense of touch, stimulated by the clarity of perspective . . . gives a new contact with *things*—stones, planks, tackle, rushlight—and gives a new energy to Crusoe's pile-driving. . . .

When Crusoe goes down with fever, therefore, though little dialogue has been possible, he is a real person to us. *Sensation in place of speech has placed us inside his head.* We fight every inch of the way with him toward survival and recovery. . . .

A ne wdepth is given to sea water . . . With sharpness and cruelty unobtainable in ordinary films, arrows (shot by the natives) wing through the air over our heads . . . The close-up of a hand making fire with a burning glass raises interesting speculations about the special advantages of three-dimensional documentaries in time to come.

SOVIET STEREO FILMS, IVANOV EXPERIMENTS

(*Continued from preceding page*)

reception accorded a recent newspaper wire service story which related the "wonders" of a new Russian film process which, sans analyzers or viewing aids of any kind, actually delivered the goods in terms of true stereoscopic motion pictures.

Not the least skeptical of the merits of this Russian process was IP, even though its pages as far back as 1941[1] bore mute testimony to the significant accomplishments in the field of stereoscopy of the Russian scientist S. Ivanov, who, it now develops, is also responsible for this latest assault on the bastion of three-dimensional movies.

Not considering itself omnipresent, and being unwilling on the basis of very meager information to rely on its judgment of an event occuring thousands of miles away, IP made every effort to dig out the facts. Its efforts in this direction have been partially successful.

Trained Observer Thrilled By Showing

First it obtained an eyewitness account by one who had viewed the Russian pictures in a Moscow theatre. Nobody, we think, can read this first-hand report by a trained observer of things cinematic and fail to be thrilled, as we certainly were, by this undoubted proof of a first-rate technical accomplishment. In addition, IP was able by devious means to obtain certain technical data which, though all too sparse to sate a voracious appetite for such information, will at least stave off starvation for the time being.

Ivanov's present system differs radically from that employed in his experimental process of 1940, a brief review of which affords an interesting basis of comparison in the evolution of the system over the past seven years. In 1940 Ivanov used in his camera only one film split into two parts, like stereoscopic photos, for the left and the right eyes. Shooting was done with an ordinary camera and did not require two objective lenses.

A simple device called a stereo-nozzle, consisting of two mirrors connected by a hinge and placed at an angle of 180 degrees to each other, was placed in front of the camera. These mirrors divided, as it were, the one image into the two that were fixed on the film. A single projector was used.

Six-Ton, 30,000-Wire Screen Used in 1940

The screen used in 1940 consisted of a special grid made of radiating transparent and opaque bars placed before a flat white sheet. Through this grid two images, taken for the right and the left eyes, were projected onto the screen. The rays of light issuing from one image, on reaching the grid, were partly "swallowed up" by its opaque bars, and partly passed through them to be projected on the screen as narrow lines. The same thing happened with the other image, with this difference only —that its narrow bars, passing through the grid, were distributed among the lines of the first image cast on the screen.

Thus the same screen showed the reflection of two images arranged in the form of an opened fan, the spokes of which followed in strict alternation: that is, if the first spoke was an element of the image meant for the right eye, the second was for the left, the third for the right again, and so on.

Ivanov's 1940 screen was formed of a metal framework weighing six tons. Over this 30,000 copper wires of a total length of about 93 miles were drawn, forming a "perspective grill." The wires were so fine and so close that they could not be distinguished one from another at a distance of about 33 feet. Extreme precision was required in fitting these wires, to the hundredth part of a mm.

One drawback of Ivanov's 1940 process (and it would appear of his 1947 system also, according to the eyewitness account) is that each spectator has to find his own best viewpoint and adhere to it: a movement of the head to left or right, a bend of the head, and the image is lost for the moment. Predictions in 1940 that this deficiency would be corrected evidently have not been borne out.

Ivanov's 1940 System Altered Radically

Ivanov has altered radically, if not abandoned, his 1940 methods for both taking and showing his films. His 1947 camera utilizes two separate films which are taken by means of synchronized camera mechanisms, the displacement of the films ranging anywhere from 65 to 750 mm apart. Unfortunately, it could not be learned whether these images are printed on a single film or two separate films are used for projection. IP's reports

[1] "Russia's Three-Dimensional Motion Pictures," by S. Ivanov, IP for April, 1941, p. 12.

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

VI. FOREIGN PROGRESS IN SOUND FILMS AND RELATIONS WITH FOX

THE first showing of acoustic films was made at the Alhambra Theatre, Berlin. These were made using the Tri-Ergon method with the sound recorded on a film about 42-mm wide and the sound placed outside the sprocket holes. (This system was worked out by three inventors—Engl, Massole, and Vogt, who had formed a sound-film company called the Tri-Ergon A. G., of Zurich.)

July 1926: F. A. Schroeder, who was the American representative of the German group, brought their system to the attention of Courtland Smith.

Aug. 1926: John Joy went to Europe to investigate Tri-Ergon for Fox.

Dec. 1926: At Joy's request Dr. Engl brought a complete unit of the German apparatus to New York for examination and tests. Records were made and shown under the direction of Dr. Engl; the results were judged to be fair, but not so good as Movietone. This was to some extent the result of the use of condenser loudspeakers in the German system. The equipment as a whole was typically German in design and offered few features that could be advantageously combined with the Movietone system.

July 1927: Fox took over rights to the German system for North America and rejected a chance to acquire the world rights. This soon proved to be a mistake, since the patents became troublesome in foreign countries, and royalties were collected on them.

Shortly thereafter, Joy and Schroeder went to Europe to get an extension of scope to the Fox agreement to permit use throughout the world. Also during this time, UFA of Germany acquired a license under the German system.

Feb. 1928: During the interval since July 1927, Tri-Ergon had tried to bring together all German companies interested in sound pictures including Siemens and Halske, AEG, and others. This was not entirely successful as Siemens and Halske and AEG wanted too much and Tri-Ergon would not agree to their stand.

Aug. 1928: Tri-Ergon formed a German operating company backed by the Commerce and Private Bank and called Tonbild Syndicate A. G. (or Tobis) with rights in Germany, Switzerland, and Austria.

Sept. 1928: Negotiations were carried on by Joy and Rogers for Fox with Tri-Ergon and Tobis to make a working arrangement to record and reproduce sound throughout the world under Tri-Ergon patents. No agreement was reached.

Nov.-Dec. 1928: Schlesinger, of London and South Africa, who had purchased the de Forest Phonofilm Company, attempted negotiation with Tobis and Tri-Ergon for joining de Forest and Tri-Ergon on a world basis. This did not go through.

Jan. 1929: Siemens and Halske and AEG combined interests in the sound picture field by organizing a company called Klangfilm.

Tri-Ergon Patent Rights

Klangfilm attempted to release a picture made by RCA in America in one of the UFA Theatres in Berlin. Tobis stopped this with an injunction on the grounds that the picture was recorded by double system *i. e.*, sound and picture separate, and recombined in a single positive. It was claimed this infringed Tri-Ergon patents. The result of the court's decision, sustained by the higher court made Klangfilm make a working agreement with Tobis.

During this time Fox interests kept up communication with representatives of Tobis and Tri-Ergon for the purpose of making a working agreement through American Tri-Ergon to permit Fox to record and reproduce throughout the world under the German patents. No such arrangement was agreed upon.

Apr. 1929: Attempts were being made at this time by various groups to join together the various Tri-Ergon interests and Klangfilm in opposition to Western Electric progress in foreign countries. Nothing resulted from this.

June 1929: Kuckenmeister, a German phonograph manufacturer, through connections with Oyens and Sons, a Holland banking firm, became interested in organizing a holding company to unite various Tri-Ergon interests, not controlled by Fox, into one group. This was concluded in June 1929, and called "Acoustic Products Company of Holland."

About this time Tri-Ergon started suits against Electrical Research Products, Inc., and during the summer obtained injunctions restraining the reproduction of all American pictures on ERPI apparatus in Germany. Some of the original decisions have since been sustained so that, except by special agreement with Tobis, American sound films were prevented from being released in Germany. Warner Brothers obtained a special license from Tobis and have released their films.

May-Aug. 1929: Joy attempted to obtain a working agreement with Tobis to protect Newsreel recording and allow

(*Continued on page* 30)

† J. Soc. Mot. Pict. Eng., April, 1947, p. 275.

have it that the images are "projected simultaneously," but no definite conclusions can be drawn from this sparse commentary.

In any event, the film is projected onto a screen made up of hundreds of small conical lenses, 4 to 5 microns thick, mounted on plate glass. This contrasts with the huge screen used in 1940, with its 30-tons weight and its grids of fine wire. Ivanov asserts that the present screen, as compared with the 1940 model, is of a "simple, inexpensive construction that can be mass-produced." In fact, he is now working on a more elaborate screen which will present "more that 1000 separate images."

Restricted Viewing Angle Reported Licked

This new system no longer makes it necessary to restrict the viewing angle to about 200 specially-positioned seats, it is stated, and the plastic effect of the image is easily and comfortably viewed from any point in a conventional-size theatre. This assertion doesn't jibe with the views expressed in the accompanying eyewitness account.

One report has it that at the start of any given picture the spectator is momentarily confused by reason of the "switching" back and forth from a two- to a three-dimensional image, but that after a few minutes the eye becomes adjusted and thereafter perceives a true depth effect.

On the basis of the information at hand, and particularly in view of reports from trained observers who have viewed the pictures, there is no reason to doubt that not only has Ivanov made giant strides forward since his 1940 experimental system, but that he bids fair to resolve in a practical manner, and soon, one of the most difficult problems ever to challenge the ingenuity of man.

TELECASTS

'Hot-Processed' Film, Tele Camera by Kodak

TWO recent developments by Eastman Kodak Co. which are giving motion picture people the jitters or, conversely, causing them to emit loud huzzahs (depending upon their views anent theatre television), are the "hot-processed" film which can be developed within 45 seconds, and a television recording camera.

The camera is so recent a development (having been officially unveiled at the recent SMPE meeting) that detailed specifications have not yet been made available. It is known, however, that the camera will satisfactorily record tele programs *at sound speed* from a monitor receiving tube. Its basic design features a 1200-foot magazine, separate synchronous motor drives for the shutter and film-transport mechanisms, and an 8-tooth sprocket pull-down actuated by an accelerated Geneva star.

Impressive Show of Speed

A very impressive demonstration of the "hot-processed" film occurred when 16-mm motion pictures taken from a plane over Atlantic City were developed on the return flight to Philadelphia, where it was rushed to the Philco tele station and broadcast within one hour of the original take-off time.

'Hot-processed' film machine uses heated chemicals to process motion picture film at high speed for tele use. Time requqired to develop, fix, wash, and dry a single 16-mm frame is about 45 seconds. As shown here, with portable water tank, compressor, and waste tank, the machine is self-sufficient. Flow of solution from jar at top is adjustable.



The processing machine utilizes a continuous flow of heated photographic chemicals and a special heat-resistant film. Using chemicals heated to about 125 degrees F., the unit can operate continuously at the rate of 8 feet of film a minute. It reduces the over-all time for complete processing of a single frame of 16-mm film to about 45 seconds, as compared with the normal time of 40 minutes required for processing at ordinary temperatures.

Special Heated Solution Used

Film can be developed to a negative or positive with the machine depending upon the process used. In the Philadelphia test the film was developed to a negative which was converted to positive pictures on tele screens by means of an electrical circuit in the video transmitting equipment.

The machine has no large chemical storage tanks. Instead, the solutions, maintained at high temperatures by a thermostatically-controlled unit, flow continuously into miniature processing tanks at a rate sufficient to maintain constant photographic quality.

Each of the three tiny tanks holds about an ounce of solution which is piped in from quart reservoirs. As excess solutions overflow each tank after 5 seconds of use, they collect in a trough and are discarded. By this arrangement the small amount of chemical in the machine at any time is renewed frequently with fresh solutions, thus eliminating most of the chemical problems of processing.

The continuous flow of chemical solutions amounts to "using 6 feet of solution for 6 feet of film."

During processing the exposed film, carried on rollers, follows a simple over-and-under path through the miniature tanks. In 15 seconds a frame of film is developed, rinsed, and fixed. Next the film is given a hot spray wash, after which it passes between squeegee rollers that remove excess water. Final drying takes place during 15 seconds when the film moves over heated drums.

The speed in processing is obtained primarily through the use of the hot chemicals with an experimental film specially prepared to withstand the high temperatures. The film is not yet ready for general distribution. Eastman is reported to view the technique as one which may eventually complement, rather than replace, present methods of processing used in the tele and motion picture fields.

"Video to Boom Film Production"... Hollywood

RETURNING to Hollywood after a nationwide tour of television facilities, producer Jerry Fairbanks lashed out at die-hards who predict dire futures for the film industry as a result of the increasing popularity of television. "Television will not supplant the theatre any more than radio has supplanted the opera house or the concert stage," he said. "On the contrary," he continued, "it can be as great a boon to the theatre as sound was to the silent pictures."

Fairbanks, who produces the "Popular Science" and "Unusual Occupations" series of short subjects, among others, is the first to start production of films made exclusively for telecasts. Patterned on a radio format, his films are produced to play individually or serially, each show being 15-30 minutes long, with 17 shows to the package.

Using 16-mm rather than 35-mm film for his production, he decried criticism of his choice. "For instance," he stated, "it is said that 16-mm negative is of poor quality when shown. Eastman is now preparing a special film for us that compares to any 35-mm on the market. Not only that, but the new Mitchell camera and lens equipment that has been developed is just as professional as the larger models."

According to Fairbanks, film will be the main source of video programming and Hollywood is destined to become the capital of a tremendous television industry. The producer emphasized, however, that theatrical film is not satisfactory for television. Explaining further, he said that shadow effects be-

(Continued on page 33)



TEN years ago, "a new and wholly independent organization," Altec Service started its business career with a promise, a dedication. Altec dedicated itself "to a broader, and more complete conception of technical service than the exhibitor has known in the past."

"Altec Service Corporation, alert, alive, aggressive, will do everything in its power to deserve, to secure, and to maintain the esteem and good will of the exhibitors of America."

In these ten years, Altec believes, it has honorably fulfilled that promise, that dedication. The judgment of the motion picture industry has given to Altec Service the responsibility of servicing more theatres than any other service organization.

Altec has consistently allied itself with the forces that work for the betterment of the exhibitor's interests and the conservation of his assets; it has made a continuous investment of its own engineering resources, in intimate cooperation with the industry's leading technical minds, to bring better quality of sound to every theatre. With scientific caution, Altec weighs and tests all new developments in science, both large and small, before recommending them to the theatres it services.

This philosophy of "service beyond the contract" has earned for Altec not alone the confidence but the friendship of its customers; looking forward to the decades ahead, Altec re-dedicates itself to a *still* broader, and *more* complete conception of technical service than the exhibitor has known in the past.

ALTEC
SERVICE CORPORATION

AN HONORED NAME IN THE MOTION PICTURE INDUSTRY

IN THE SPOTLIGHT



By *HARRY SHERMAN*

HEALTH insurance and other benefits for the families of union members is rapidly being recognized as an integral part of labor contracts. Recently the Upholsters International Union (UIU) reached an agreement with more than 1,200 firms in that industry extending hospital insurance to the wives of union members, and to their children ranging in age between three months and eighteen years. The agreement provides for hospital benefits of $4 per day for a maximum of 31 days for each disability, and up to ten days for maternity cases.

In the event of sickness or accident, members covered by this program will receive 60% of their wages, with free medical, surgical and hospital care. Death benefits range from $500 to $1,000, depending upon the term of employment. Under this plan, employers contribute three per cent of the wages earned by members under contract. The UIU officials had high praise for the employers who consented to the increased benefits for the workers without making added charges for them.

• Returning home from a union meeting, Howard Kennar, member of Syracuse Local 376, drove his car into his garage and alighted while the car rolled back on an incline, pinning him between the door of the garage and the car. When the accident was discovered, Kennar was beyond all medical aid, having been choked to death. He is survived by his wife and a son, Edward Vincent Kennar.

• Abe Zumar, secretary of Local 257, Ottawa, Canada for many years, is a very resourceful individual. Not being content with his income as projectionist, he also heads the radio department of one of the largest department stores in Ottawa.

• Another crony of our youthful days has become eligible for membership in the ever-widening A. K. Club. Red Rupard, member of Dallas Local 249, informed us recently of his daughter's marriage and impending motherhood. Okay, Red, a rocking chair is awaiting you.

• We are happy to report that Charlie Heath, member of Boston Local 182 and projectionist for RKO, for many years has recovered from his recent illness and has returned to his job.

• We take our hat off to Charlie Dentelbeck, chief projectionist for Canadian Famous Players circuit, for his sincere deep concern for the well-being of his fellow workers. During our recent visit to Toronto we learned that Bill Ayers, old-time member of Toronto Local 173 and projectionist employed by Famous Players, sailed for Europe last summer on the Acquitania. He was taken ill on the boat and when it docked at Southampton he was rushed to a hospital where he remained for six weeks. Upon his return to Canada he was bedded by his physician for another seven months.

Hearing of Ayers ill fortune, Dentelbeck appealed to the officials of the circuit (of which our very good friend, John Fitzgibbons is president) with the result that Famous Players put Bill on full pay for two weeks, and on half pay for an additional six weeks. After that he received $75 per month until he was well enough to return to his job at the Tivoli Theatre. Charlie Dentelbeck did more than give lip service to a brother in distress—as so many of us are apt to do—he really went to bat for him.

• Out-of-town visitors to the offices of I. P. last month included Herb Aller, business agent of Cameramen's Local 659 and Ted Ellsworth, business agent of Costumers Local 706, both of Hollywood, Calif. Bert Ryde, business agent of Buffalo Local 233, was another out-of-town visitor.

• We record here the passing of another old-timer, Harry Engle, 78, business agent of Local 139, Schnectady, N. Y. Harry had been in ill health for quite some time and had been failing steadily. He was one of the "regulars" at I. A. Conventions, having represented his Local at these gatherings for many, many years.

• A peculiar situation has developed in Syracuse, N. Y. Syracuse Local 376 is seeking a six-day contract to which the exhibitors object with the lame excuse that if granted, other Local Unions in surrounding territories would make similar demands.

Ours is one of the very few organized crafts where a man is expected to work seven days a week, including all legal holidays, without extra pay. Although this condition has been corrected in many spots throughout the country, we believe that there still is much to be done to put the projectionist craft on an equal footing with other organized crafts where working conditions are concerned.

10th DISTRICT LEGISLATIVE COMMITTEE, I. A. CLEVELAND CONVENTION, JUNE, 1938

(1) Glenn Humphrey (deceased), Utica L. 337; Wally Byrne, New York L. 306; James Lemke (deceased), Troy L. 29 and former I. A. president; Harry Brooks (deceased), Troy L. 285; Mike Mungoven, Rochester L. 25; Sal Scoppa, New York L. 52; Tom Murtha, Brooklyn L. 4; Arthur Martens, Westchester L. 650.



We believe that every man is entitled to have at least one day a week for himself, and if he is expected to put in a seven-day work week, he should be properly compensated for giving up his day of rest.

• A stiff campaign is being waged for the presidency of New York Local 306, with Joe Basson, I. A. representative and former 306 president, opposing Herman Gelber, who has held office since 1942. The election, which will be held the end of this month, promises to be a bitterly contested one.

★ ★ ★ *Holiday Greetings* ★ ★ ★

LOCAL UNION NO. 279, I. A. T. S. E.

HOUSTON **TEXAS**

• It is not every Local Union official who, at the end of the year, can point with pride to a list of achievements for the past twelve-month period. In his recent summary report for the year 1947, Gene Atkinson, business manager for Chicago Local 110, fulfilled promises made to his membership to present them with an honest and unbiased report of the Local's activities and finances at the end of each year. We had the good fortune to see a copy of his recent report and we were deeply impressed with the tremendous strides made by the Local under the leadership of this fearless and energetic union official. Summed up briefly, here are a few of the accomplishments Atkinson reported for 1947:



Eugene Atkinson

He organized new jobs for his members by (1) placing a Local 110 man in charge of 16-mm pictures shown at the Chicago State Hospital at a salary of $500 per month for a 40-hour week, two weeks vacation with pay, and one day per month sick leave; (2) successfully retaining all Local 110 men at race tracks within the Local's jurisdiction; (3) strengthened the Local's position in the 16- and 35-mm portable field throughout the City of Chicago; (4) placing two members of the union with the B & K circuit as supervisors of projection equipment installations at a salary of $10,400 per year, per man, and (5) three of the major theatre supply houses employ Local 110 men as supervisors of projection installations, each man receives $150 per week.

An agreement was reached with the B & K circuit regarding the shut-down of the Drake and Admiral Theatres. Projectionists were returned to their jobs and back salaries for time they were locked out of the theatres were paid by the circuit.

Due to the efforts of Atkinson, Senate Bill 435, State of Illinois, was passed reclassifying motion picture operators to motion picture projectionists, thereby changing the projectionists' classification from "laborer" to "skilled technical craftsman."

Television station WKBK employs a Local 110 projectionist. The Local has complete television jurisdiction in Greater Chicago and is prepared to cover all available jobs.

By combining the office of secretary-treasurer with that of the assistant business agent, the Local saved $13,650 in salaries in one year.

Working and sanitary conditions in projection rooms brought to a high level—running water and toilet facilities installed where none existed before, rooms painted, floors covered, old and worn projection room equipment replaced, proper ventilation provided, *etc.*

Projectionists showing special features at increased admission prices receive a higher scale of wages.

Despite the pessimism of many, Atkinson's insistence upon paid vacations and paid "prep" time has produced results. These features are now incorporated in all the Local's contracts.

Also, in keeping with the established policy of the Local, generous contributions were made to the following worthy organizations: Red Cross, Community Fund, Jewish Welfare Fund. Boystown, and the Crippled Children's Shrine Hospital.

Atkinson is now working on a retirement and disability plan for the members, and expects to have it in working order no later than April 1948. To sum up, we believe he not only embarked upon a pretty ambitious program for 1947, but he actually accomplished all he set out to do.

• Jack Stringer and Charlie Hallet, members of Toronto Local 173, have been close friends for many years and are tagged the "gold-dust twins" of Toronto. One seldom sees one without the other, and from reports gathered on our recent visit to their town, they are both equally poor card players.

• At a meeting of 105 A. F. of L. presidents in Washington several weeks ago, I. A. President Walsh was named to the 30-man administrative committee for the newly organized Labor's Educational and Political League. The League will ask each union member for a voluntary contribution of one dollar to help fight the economic effects of the Taft-Hartley Act and to defeat other anti-labor legislation.

According to a statement issued by President Walsh, the I. A. will form a set-up similar to that established by the A. F. of L., and will have a political committee in each Local Union. We hope every I. A. man will cooperate with his Local's committee and give his fullest support to this important project. Now is not the time for union politicians to start so-called "economy drives." Let every man get in and pitch for victory in our fight to defeat labor's foes—we are all in this, we either swim or sink together.

• The International Projection Society of Toronto held its annual election the early part of this month re-electing Jack Hills, president, Roy O'Connor, vice-

(Continued on page 33)

Season's Greetings

THAD C. BARROWS

25/30 CLUB BOSTON LOCAL 182

PEERLESS HY-CANDESCENT LAMP

(*Continued from page 6*)

bon axis. Thus the positive crater may be operated relatively close to the rear condenser without interference between the negative holder and the lens mount. The negative carbon arm attaches to a metal plate in advance of the insulation point, which need not be broken down when cleaned or otherwise used.

A flat clock spring is connected to the negative pinion shaft at its inner end and the spring housing at its outer end. This spring effectively counterbalances the negative carbon arm and its carriage and also lessens the load on the feed gearing and motor. The result is a featherweight feed of the negative holder.

Hy-Candescent Condenser System

The Hy-Candescent lamp utilizes an F:2 condenser system manufactured on an exclusive basis for J. E. McAuley Co. by Bausch & Lomb Optical Co. The rear lens is obtainable made of either fused quartz or Pyrex glass. This lens, 6¼ inches in diameter, has a ⅜ inch edge on the rear surface to accommodate several resurfacings when the lens is badly pitted. The front lens, made of B. & L. Corex glass, is 7⅜ inches in diameter.

Operating distance between arc crater and the rear lens is 3 inches, while the working distance between the front lens and the film is 12 13/16 inches. These distances were calculated to enable an 80% side-to-center screen light distribution.

The exigencies of operating a condenser-type high-intensity lamp in the 160 to 180 amperes range require that some means be provided for effectively reducing the heat at the aperture and thus helping to prevent severe damage to the film. To this end the J. E. McAuley Co. some years ago developed an air-cooled, glass heat filter unit.

Special Heat Filter Unit

The filter's main frame is attached to the rear face of the projector shutter housing. Fitted into this frame is the holder for the filter glasses. This holder is so constructed as to provide ample room between all sides of it and the main frame. A centrifugal electric blower is utilized to blow an adequate amount of air into this frame.

Eight glass filter strips, each ½ inch wide, are mounted in the holder vertically and in a staggered pattern to provide for thermal expansion and assure maximum cooling effect. The air from the blower passes over the entire glass surfaces and ends.

The manufacturer recommends that the blower motor be hooked-up to the open end of the arc lamp switch so that when this circuit is energized the blower may be started and stopped simultaneously. The air from the blower runs through a exible plastic tubing and is exhausted through the top of the lamp housing. The glass used is Corning's Aklo No. 3966.

These filter units and blowers are now in use in many de luxe theatres throughout America, including the Radio City Music Hall and the Roxy Theatre in New York City, the Chicago Theatre, Chicago, and in many drive-in operations which utilize high-amperage projection.

Water-Cooled Positive Contacts

As an aid to certain experimental work now being conducted with carbon arcs pulling up to 290 amperes, the J. E. McAuley Co. developed and made available for these research programs a Peerless Hy-Candescent lamp which, among other modifications, includes a water-cooled positive contact assembly.

The facing halves of the contacts are made of pure silver, while the rear halves are brass castings. Each pair of castings is so constructed that when assembled they afford a hollow compartment for the circulation of the water. The water runs through a copper tube to the top of the compartment, the outlet being by another tube at the bottom.

A measure of the effectiveness of this unit may be had from the appended table which was included in a paper on this topic presented before the recent SMPE convention. These readings were taken on an arc pulling 290 amps and with only a ½-inch positive carbon protrusion from the face of the contacts and without the usual heat baffle plates being used. The figures are shown in Table A.

Total water flow ..... (Approx. 1 Gal)	Degrees F
Room temperature during test	72
Outlet water temperature before test	69
Outlet water temperature after 10 min. operation	88
Outlet water temperature after 20 min. operation	93
Maximum temperature rise of water above room temperature	21
Maximum temperature rise of water after 20 min. operation	24

So successful were the tests made with this water-cooled unit on experimental lamps operating at 290 amperes that the J. E. McAuley Co. expects to make it available to those theatres now using the standard McAuley 120-180 ampere lamp and who are willing to supply the necessary water connections in their projection rooms.

★ ★

LOS ANGELES PROJECTIONISTS LOCAL UNION NO. 150

extends to all its friends in the

I. A. T. S. E.

the Season's Greetings

★ ★

Experiment in Screen Masking

By ROBERT ALLEN MITCHELL

PROJECTIONISTS cannot help but notice, when examining film, that the frames printed on the film usually have *rounded*, rather than *square*, corners. This is due to the shape of the standard camera aperture. In the old days nearly all projectors were furnished with round-corner apertures, but the difficulty of masking screens with corresponding rounded corners brought the square-corner aperture into vogue.

At the risk of evoking loud guffaws from those who consider rounded corners "old fashioned," I here relate an experiment I carried out in a small seasonal house last summer. I hope the skeptics will consider carefully the outcome of these tests.

The first step was to provide rounded corners for the picture and to note the audience reaction. I substituted round-corner aperture plate for the square-corner ones in the projectors, and I masked the screen to match the projected round-corner frame. (I used dead-black cardboard for the rounded corners, but black velour-covered plywood will be used for permanent installation.)

Sharp Cutoffs Banished

A test run of film with the new setup left no doubt as to what reaction to expect. The result was gratifying, to say the least, The screen not only *looked* better with rounded corners, but the *boundaries* of the screen image (that is to say, the *edge*) practically vanished to the mind's eye as one watched the picture.

The reason why a round-cornered screen seems less definitely restricted in area than a square-cornered one is undoubtedly psychological, but the effect is too great to be ignored.

From what I could learn from patrons, I am convinced that a round-cornered screen makes it much easier for the spectator to "lose himself" in the story being told by the film. This effect was observed even in patrons who were not directly conscious of the exact shape of the picture framing!

The next step in the experiment was to remove the round-cornered screen masking and to restore the square-cornered apertures. Dissatisfaction was immediately expressed by many patrons, especially those who attended the theatre rather frequently. The sharp, square corners stood out like four sore thumbs, and they competed (in a psychological way. I suppose) with the picture itself to gain the attention of the audience, making it slightly more difficult to become absorbed in the screen drama.

The important result of the experiment is this: *rounded corners augment the dramatic illusion of the picture; square corners operate against it.*

Urges SMPE Investigation

I suggest that the SMPE investigate this matter and, if tests establish the above result as fact, to adopt the round-cornered screen as the American standard. I further propose that the radii of the rounded corners be 1/16 the width of the screen, and that the round-cornered screen whose height and width are in the ratio of 3:4 be known as the "standard motion picture quadrilateral".

Identical Corner Curvatures

There are, to be sure, a few theatres that have always employed round-cornered apertures and screens—but all too few. Projectionists who wish to adopt the "standard quadrilateral" in their own theatres are cautioned to exercise great care in cutting the corners. All four should be identical in curvature, and the curves must be absolutely smooth.

The material used must match the screen masking in color and "deadness." As stated above, the radii of the rounded corners are best when 1/16 the width of the screen; thus the corners for a screen 16 feet wide should be curves of one foot radius. Round-cornered apertures must be used in conjunction with the screen masking.

Round-Corner Images Long Tabu in Field

MR. MITCHELL'S advocacy of round-cornered screen images focuses attention on a question that is being given increasing attention by serious workers in the art. The trend to date has been toward the abrupt cutoff of the screen image, *via* masking, with the corners being the least important aspect of the problem as viewed by psychologists, architects and others.

In fact, several opponents of the present screen image, format are flatly opposed to any masking of the screen image, their idea being that instead of a sharp cutoff of light at the masking edge there should be employed some means for effecting a gradual diminution of light all around the image. Chief proponent of this idea is Ben Schlanger, noted theatre architect, who has long been concerned with the psychological aspects of screen images in terms of lighting and form.

There is no question but that current, almost universal masking and aperture practice is designed to sharply confine screen light, with masking and square corners utilized to heighten the sharp cutoff.

Significantly, Loew's Theatres, for many years the foremost major-circuit proponent of rounded screen image corners, has but recently completed the task of switching over to square corners. In fact, round corners were seen in recent years only in the Loew theatres, so pronounced was the preference of projection supervisors for square corners. I.P. should like to hear from the field on this topic.

Greetings . . .

to the Projectionists from the Cameramen of the eleven Western States

CALIFORNIA NEW MEXICO OREGON
WASHINGTON MONTANA NEVADA
COLORADO WYOMING IDAHO
UTAH ARIZONA

HERBERT ALLER, Business Representative

Hollywood Local No. 659, I. A. T. S. E.

Republic Votes Stock Dividend

The board of directors of Republic Pictures Corp. recently voted a regular quarterly dividend of 25 cents per share on preferred stock, payable January 2, 1948 to stockholders as of December 10, 1947.

Altec Service Celebrates 10th Anniversary

WITH sound engineering research as the keynote, the Altec Service Corporation of New York, N. Y., this month observed their tenth year in the field of sound service. An outgrowth of Electrical Research Products, Inc., a subsidiary of Western Electric, Altec was founded by a group of ERPI employees upon W.E.'s decision to divorce itself from direct exhibitor service.

A subsidiary, the Altec Lansing Corp., manufactures theatre loudspeakers, but Altec Service specializes only in servicing theatre motion picture equipment.

In a statement commemorating the anniversary, G. L. Carrington, president of Altec, stated that it has been and will continue to be the policy of the corporation to be prepared with plans for techniques and methods to incorporate new developments in their clients' theatres long before these new improvements even get to the theatres. Continuing, Mr. Carrington said, "The reason for this is that behind the scenes, Altec engineers work continuously with the sound engineers in the producing companies, the research engineers in the Academy and the engineers in the equipment manufacturers' plants, so that they are always ready to meet a new situation even before the exhibitors know it exists."

New Developments Noted

With 6000 theatres in the nation as clients, Altec Service has become a mature and seasoned organization, with the respect of the entire motion picture industry.

Foremost among new Altec developments is a new Service Meter, which will enable trouble-shooting Altec inspectors to diagnose sound system failures in a matter of minutes instead of hours. Further, it permits the discovery of such failures before they have a chance to create a complete breakdown in the system. Other developments in past years have included the AQ-1030 Equalizer for modernizing old equipment, a magnetic speaker, which precluded the use of power-supplies containing critical wartime material and an all-purpose emergency amplifier to be hooked up for use while the regular theatre amplifier was being repaired.

GPE Theatre Television Bid

Indicating that the development of television will not be left to the ministrations of the radio and telephone groups was forthcoming through a recent announcement by General Precision Equipment Corp. that a radically new system of large-screen tele is now undergoing an intensive experimental program at its laboratories in Pleasantville, N. Y.

GPE is the largest single manufacturer of motion picture equipment in the world, with 13 subsidiaries in the U. S.

Tele No Threat to Pics

Half of the technicians working on this new system have had previous electronic experience on radar projects at Massachusetts Institute of Technology, it was revealed by GPE chairman of the board Earle G. Hines. While declining to discuss details of the system at this time, Hines expressed the belief that it would require about five years for any theatre television system to match the quality of present motion picture projection.

"I do not regard theatre television as a threat to the economic welfare of the motion picture industry," said Hines, adding that the new art could be extremely helpful "provided the film industry *as a whole* cooperated in an intensive and comprehensive research program."

This statement was regarded as an oblique reference to the present situation wherein several film companies have embarked on individual tele programs, the while the industry's technical forces have met with nothing but producer rebuffs to their pleas for a coordinated effort.

'Just More Showmanship'

Stressing the fact that television after all is "just another form of showmanship," Hines advocated the immediate formation of an industry-wide tele research organization which would utilize not only its own engineers but outside scientific talent as well. He characterized the present video activities of Warners and 20th Century-Fox, in collaboration with RCA, as "a step in the right direction," but emphasized his belief that the scope should be widened to include every branch of the film industry so that "progress not be frozen."

The great significance of the GPE statement lies not only in the fact of its pre-eminent position as a manufacturer but also by reason of its pioneer step as a purely motion picture equipment company. GPE subsidiaries in the U. S. incude International Projector Corp., Hertner Electric Co., Strong Electric Corp., National Theatre Supply Co., Ampro Corp., and, of course, the ultra-modern Pleasantville laboratory.

New RCA Tube Manual Out

A new edition of the RC-15 Receiving Tube Manual has been released for distribution by the Commercial Engineering Section of the RCA Tube Department. Long the most complete and authoritative handbook on receiving tubes; the new edition, first since 1939, presents many new features, including data on FM, miniature tubes and television broadcast receivers.

Sections on tube and circuit theory have been expanded and the classification chart has been brought completely up to date. New application data includes circuits on ratio detectors, discriminators, limiters and multivibrators. Copies will be available this month through RCA tube distributors.

AT ALTEC'S TENTH ANNIVERSARY RECEPTION HELD AT THE WALDORF-ASTORIA HOTEL, NEW YORK

Left to right: Harald Wengler, Altec advertising manager; Emil Smith, president, Westchester Local 650; I. P.'s Harry Sherman; and Joseph Schappach, business agent, Westchester Local 650, make up a happy foursome at reception.



Left ta right: Harry Sherman; Walter E. Green, president, National-Simplex-Bludworth; Mike Berkowitz and Cecil Wood, Sr., members New York Local 306; and Earl G. Hines, chairman of the baard, General Precision Equipment Corp.



PROJECTION DATA CHARTS

(*Continued from page* 10)

the square of the old throw by the square of the new throw.

FORMULA (Δ_1 is the old throw; Δ_2 is the new throw):

$$B = \frac{\Delta_1^2}{\Delta_2^2}$$

To determine the change of width of a picture with a change of throw, the lenses remaining the same:

RULE: *To find picture-width change with a change of throw* multiply the old picture width by the new throw. Divide the product by the old throw. The result will be the new picture width.

FORMULA (P_1 is the old picture width; Δ_2 is the new throw; Δ_1 is the old throw):

$$P_2 = \frac{\Delta_2 P_1}{\Delta_1}$$

To determine the new throw required to change picture width to a desired width without changing lenses:

RULE: *To find the new throw* multiply the new desired picture width by the old throw. Divide the product by the old picture width..

FORMULA (Δ_1 is the old throw; P_2 is the desired picture width; P_1 is the old picture width):

$$\Delta_2 = \frac{\Delta_1 P_2}{P_1}$$

Met to Film Operas in Color

Completion of arrangements to film and exhibit operas throughout the world has been announced by the Metropolitan Opera Association of New York. The films will be produced in 35-mm color by International Opera Films, Inc., under the direction of Friedrich Feher.

Mr. Feher, originator and organizer of the project, is a pioneer in the industry, having started with Pathe in Germany in 1910.

Opera films will be shown first in art theatres, then reduced to 16-mm for exhibition in schools and clubs. Production is scheduled to begin this month with the filming of "Il Trovatore" at Fox-Movietone's New York studios. The music will be recorded first, action then being synchronized with the sound track. The only scenes to be shot in the Opera House will be those of the orchestra in the pit. Casts will be selected from the Met's roster of world-reknown singers.

Edward Johnson, general manager of the Metropolitan, stated in connection with the project, "This is one more step in the direction of our ultimate goal: to bring more opera to more people in all parts of the world through tours, broadcasts, records, and now film."



...if looks could hurt!

• Bad sound brings on looks like these. They're aimed to hurt you plenty whenever bad sound ruins an otherwise top-notch show.

To make sure your sound has the snap and clearness that pleases every patron, sign up for RCA Service.

Through RCA Service your equipment gets regular checkups by a skilled factory-trained technician. He is backed by the finest test equipment, test films and sound engineering in the business. You get fast service on parts. You get prompt help in an emergency.

Stop worrying that sound troubles may hit you where they really hurt. For the cost of a few admissions a day you can protect yourself against the sound trouble bugaboo.

RCA SERVICE COMPANY, INC.
RADIO CORPORATION of AMERICA
CAMDEN, N. J.

Greetings—
from the
West Coast Film Editors
Local 776, I. A. T. S. E.
JOHN LEHNERS, *Business Representative*

(*Continued from page* 14)

close of the 1830s that the wage-earners' unity for their economic welfare in the industrial field and their political unity at the polls were as disconnected as the workmen's religious affiliations were separate and apart from their trade union affiliations and their loyalty to collective action with their fellow workmen when endeavoring to protect their economic interests.

The leaders of the National Labor Union favored the program of partisan political action. It seemed to them that the economic effort through trade union action in industry was too slow. Also some of the most energetic of the leaders had become impressed with the new and revolutionary teachings of Karl Marx. In fact, one outstanding officer had carried on an extensive correspondence with Socialist leaders in England and Germany.

These leaders did not advocate the overthrow of the American form of government with its free institutions, and the substitution of socialism with its state control of industry and those who worked in it. They were sturdy Americans, convinced that liberty could only be secured and maintained when the state existed for the people, instead of the people existing for the state.

What the leaders of the National Labor Union believed essential to a speedier improvement of labor's standard of existence was the election to public office of men from labor's ranks, or those who were friendly to labor's welfare. They worked prodigiously to arouse a partisan political sentiment in workmen's minds, but they mistook the interest and applause of a few as an evidence of the sentiment of labor as a whole.

In the national elections of 1872 the National Labor Union, without placing a national ticket in the field, did endorse the candidate for vice president named by one of the political parties. In many states the organization nominated its own candidates for the Senate and House of Representatives.

National Labor Union Dies

The results of the election were disastrous for the National Labor Union. Practically all of its candidates were overwhelmingly defeated. Workmen in that election made it clear that no matter how united they might be in the shop, or how loyal they were to their union, politically they were independent, and would not permit their trade union officers to lead them into any partisan political camp. The results of the election were a stunning blow to those who believed that labor, united in trade unions, could be united at the polls.

The failure to secure the relief they had expected through successful political action not only placed a definite damper upon their political ambitions, but what could not be avoided, it also shook the confidence of many wage-earners in the ability of labor to protect itself through trade union organization.

This collapse of their political program was followed shortly by the panic of 1873. Shops closed their doors, com-

IT'S BETTER BECAUSE IT WAS DESIGNED AND BUILT BY PROJECTOR SPECIALISTS

The Great New



MOTIOGRAPH

"PROJECTORS"

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Greetings and Best Wishes

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HAPPY HOLIDAY

ALBERT F. RYDE

Business Representative

Moving Picture Projectionists

Local No. 233, I. A. T. S. E.

Buffalo, N. Y.

merce stagnated, unemployment was widespread. Some national unions were unable to weather the storm and passed out of existence; others were barely able to keep their heads above water. With its financial income cut off, the National Labor Union expired.

The more thoughtful of labor leaders, in examining the causes for their political failure and the further disintegrating effect of the great industrial depression upon the trade union movement, noted, among other things, that it was the national and international unions whose members possessed the higher grades of craft skill that managed to maintain their organizations while the wreckage of others surrounded them. The reason was not difficult to find—the skilled craftsmen retained their confidence in craft unions even during a time of depression.

It was this nucleus of spartan veterans who kept craft unionism alive, gathering strength and confidence for the great contest of ideas, ideals and theories which was about to divide labor into violently conflicting camps.

[To be Continued]

General Precision Declares Dividend

The consolidated net operating profit of the General Precision Equipment Corp. and subsidiary companies for the quarter ending September 30, 1947 amounted to $174,300 after provision for federal income taxes. This figure is subject to year-end adjustment.

The company's board of directors also declared a 25 cents-per-share dividend on capital stock, payable on December 15, 1947 to stockholders as of November 25, 1947.

Kodak Declares Stock Dividend

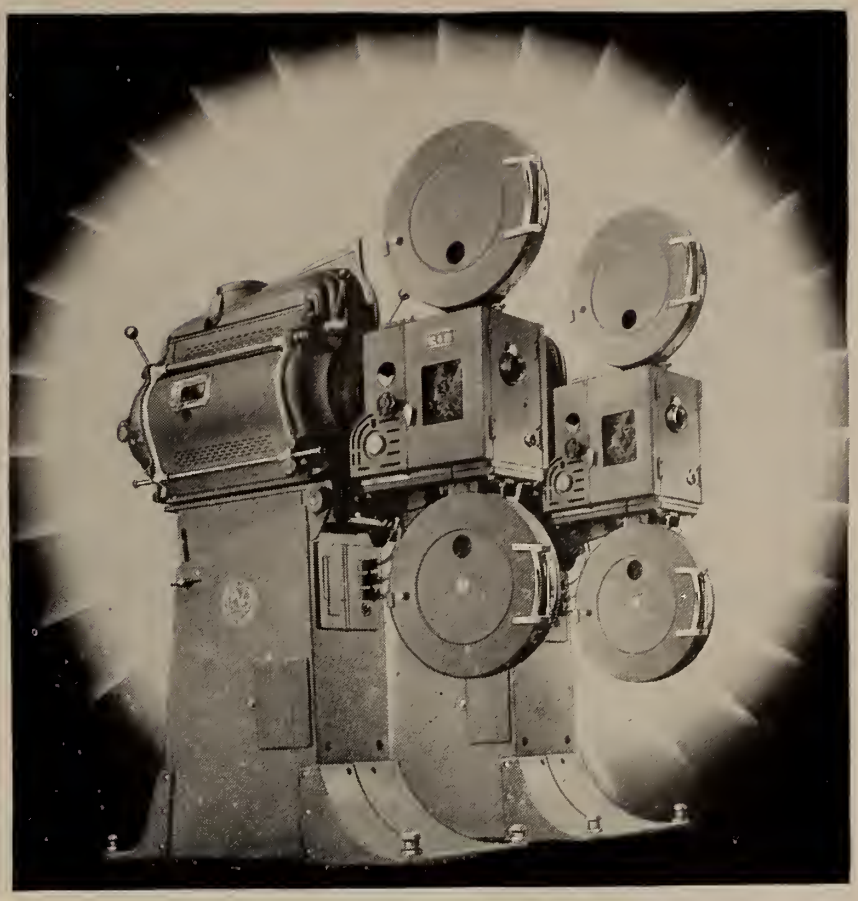
The board of Directors of the Eastman Kodak Co. recently announced a common stock dividend of 55 cents per share for the quarter and the regular 1½ per cent dividend on preferred stock of $1.50 per share. All dividends will be paid on January 2, 1948 to stockholders as of December 5, 1947.

Since Eastman split its common shares 5-1 last April, common stock dividends this year total $1.60 a share, compared with dividends in 1946 equivalent to $1.40, figured on the basis of the new share.

Blue Seal Appoints World Distributors

Formerly Latin American distributor, Cinematograph International, Inc., has been appointed world-wide distributor for Blue Seal Cine Devices, according to a recent announcement by J. Burgi Contner, Blue Seal president.

Under the new contract, Cinematograph has a 5-year exclusive franchise and will immediately commence the appointment of local distributors throughout the world. The distribution setup will be under the guidance of M. D. Faige, C. I.'s general manager, recently returned from an extensive tour of the Latin American markets.



NEW DeVRY EQUIPMENT

is Helping Exhibitors Achieve "Perfect Show"

WHETHER yours be a 250-seat to 6,000 seat theatre—or a drive-in with up to 1,000-car capacity—you will want to know all about DeVRY's "12000 Series" theatre projectors, amplifiers and improved In-Car speakers before you buy.

With sound head and picture mechanism in one complete unit . . . with patented silent chain drive . . . with war-proved rotary sound stabilizer and a host of other mechanical, optical and audio refinements, DeVRY "12000 Series" theatre projectors are now being installed in finer theatres from the Hudson Bay to the Gulf of Mexico. See them in action at the DeVRY theatre supply dealer or actual installation nearest you. DeVRY Corporation, 1111 Armitage Avenue, Chicago 14, Illinois.

In Canada contact Arrow Films Ltd., 1115 Bay Street, Toronto 5, Ontario.

For the Perfect Show Indoors or Out — Your Best Buy is a DeVRY

CLAYTON BALL-BEARING EVEN TENSION TAKE-UPS

For all projectors and sound equipments

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THE DAYTON FILM, INC.
2227 Hepburn Ave. Dayton 6, Ohio

HISTORICAL DEVELOPMENT OF SOUND FILMS

(*Continued from page* 19)

release of Fox products in Germany. No arrangement was concluded.

Various conferences were held among representatives of ERPI, Tobis, Siemens, and AEG both in Europe and in America. No agreement was reached.

Sept. 1929: Schlesinger concluded an arrangement with Kuckenmeister in which his British company was allied with Tobis and Klangfilm. Advantages Fox could have had were now being acquired by others.

Oct. 1929: Tobis brought suit against Movietone in Germany and Austria. All Fox Newsreel trucks were removed from these countries.

During the last six months of 1929, both Tobis and Klangfilm moved forward, both in theatre installations and in the production of sound pictures. They made an alliance with a French producing company, and arranged to begin work in France.

June 1930: Will Hays headed a committee in Paris which met to deal with foreign sound problems and to attempt a settlement of German relations. This tangled situation was finally ironed out and a compact was arrived at on July 22 permitting the showing of American films abroad.

Sound Work Under W. E. Systems

1925-'26: Major development of the disk system of sound motion pictures, later trade-named "Vitaphone," was carried on by a group in the Bell Telephone Labs. headed by Dr. J. P. Maxfield. At about the same time, another group headed by Dr. Crandell and Dr. MacKenzie were working out a sound-on-film system using a "light valve" designed by Dr. Wente in the recording.

Apr. 20, 1926: Western Electric Co. entered into a contract with Warner Brothers and W. J. Rich, a financier, giving them an exclusive license for recording and reproducing sound pictures under the Western Electric system. The Vitaphone Co. was formed.

June 1926: The Vitaphone Co. opened a recording studio at the Old Manhattan Opera House, 34th St., New York.

Aug. 6, 1926: Warner Brothers gave their first public performance of Vitaphone at the Warner Theatre, New York, showing a scored picture "Don Juan" and several shorts including a talk by Will Hays, and songs by Martinelli, Marian Talley, and others. This received favorable comment from some papers, enthusiastic comment from others, and grave doubts from the industry that talking pictures would ever be commercial.

Dec. 1926: The Vitaphone corporation gave Fox a sublicense to use Western Electric equipment in the field of sound pictures.

Dec. 31, 1926: Western Electric had equipped about twelve theatres with sound installations for Vitaphone.

Jan. 1, 1927: Electrical Research Products, Inc. (ERPI) was formed as a subsidiary of Western Electric and AT&T to commercialize equipment for the sound motion picture field, the equipment business having been bought back from the Vitaphone Co. The name Vitaphone

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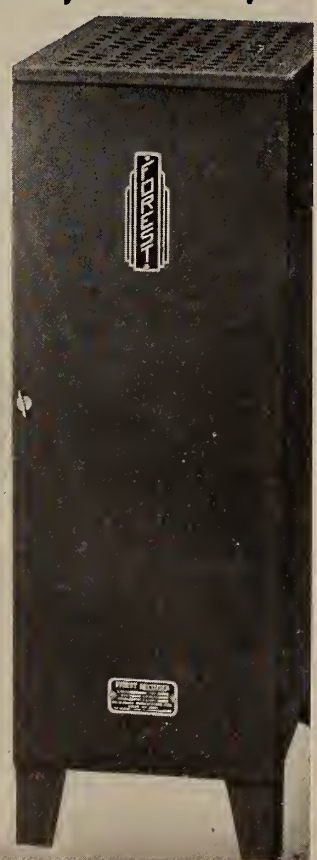
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6-tube RECTIFIERS



MODEL 75-V-6 . . . The result of highly technical knowledge gained from building rectifiers for radar and other intrinsic scientific devices—achieving a new high for rectification efficiency at the lowest possible cost of power. Designed for all theatres using Suprex or Simplified High Intensity Projection. Built-in remote control relays with provisions for operating spotlights. Full 3-phase rectification. No moving parts. Power with flexibility—constant and uniformly smooth current—no flicker. Quiet and ease of operation. Sturdily constructed all steel case.

Insist on the Best -- Forest Products:

75-V-6 Rectifiers, Super MCS, LD-60 and LD-30 Bulb Type Rectifiers, Rectifying Tubes and Sound Screens.

FOREST Mfg. Corp., 60 Park Pl., Newark, N.J.

SEE PAGE 33 FOR FOREST ELECTRIC PROJECTION LAMP

was retained by Warner Brothers for their sound picture system.

Spring 1927: Vitaphone recording was moved to Hollywood.

'Big Five' Agreement

Feb. 23, 1927: MGM, First National, Paramount, Universal, and PDC, termed "The Big Five," agree to stand together for the purpose of determining the right sound system and used the facilities of the Hays organization for this investigation.

Apr.-Aug. 1927: ERPI made their first light-valve installation in the Fox Movietone studio at 54th St. and 10th Ave., New York. This was installed at ERPI's expense and operated experimentally by Bell Telephone Lab. engineers. The ERPI film processing specifications were rigid and their technique of operation was not sufficiently advanced to impress the Fox group that the light-valve system offered any commercial improvement over the Case system then in use.

Apr. 19, 1927: Warners secured 100 per cent ownership in Vitaphone by purchase of W. J. Rich's interests.

Oct. 1927: Warners released "The Jazz Singer." This is spoken of as the turning point in the coming of sound, and served to convince the industry of its potentialities.

Dec. 31, 1927: One hundred and fifty-seven theatres were equipped for sound, of which fifty-five included film units. The rest were disk only.

Apr.-May 1928: ERPI contracts were signed by the "Big Five" group. This ensured the general use of talking pictures. The Warner contract was revised when ERPI took over the equipment bsuiness and a new Fox license was also signed about this time. Victor and First National announced the release of their product under the name of "Firnatone." The ERPI licenses granted during this period included the following companies: Paramount, United Artists, Metro-Goldwyn-Mayer, First National, Universal, Christie, Hal Roach, and Victor Talking Machine Company.

Interchange of Equipment

May-Dec. 1928: There was great activity in getting studios equipped for recording. Everyone wanted to start at once and equipment was at a premium, with deliveries most indefinite.

At about this time, sound equipment and recordings were standardized to a sufficient extent that apparatus made by either RCA or ERPI could satisfactorily play the product made with the other equipment. In the beginning, ERPI tried to restrict the use of its equipment to sound tracts made on the Western Electric system.

July 1928: Paramount began recording in Hollywood on a temporary channel and first used sound in their picture "Warming Up," with Richard Dix.

July-Sept. 1928: Their first all-talking picture was "Interference," directed by Roy Pomeroy. This was followed by "The Doctor's Secret" and others. During this early work in a temporary studio, many of the scenes were made at night to avoid outside noises.

Dec. 1928: Paramount began recording in its new sound studios on regular channels.

Dec. 31, 1928: ERPI had 1046 theatres wired for sound, of which 1032 were for sound-on-film.

Jan. 1929: Warner Brothers became interested in the Pacent sound system and approved Pacent installations in April 1929. ERPI began suit against Pacent for patent infringements.

Aug. 3, 1929: The first issue of Paramount Sound News was released.

Dec. 31, 1929: The tremendous growth of the sound motion picture business in a little over two years evidenced by the fact that there were 77 ERPI recording channels in operation in the United States. ERPI also had equipped about 4000 theatres in this country and some 1200 in Europe. Most of the theatre

Runs— BUT IS IT MODERN?



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Best Wishes For 1948

from

Detroit Motion Picture Projectionists Local No. 199

I. A. T. S. E.

installations were for both sound-on-film and sound-on-disk.

Also at this time it became evident that there was a trend to favor sound-on-film over sound-on-disk for theatre release purposes.

Apr. 1930: Warner Brothers announced the purchase of an interest in the T. H. Nakken patents. These patents related to the use of a photoelectric cell and an amplifier. (Subsequently they were used as a basis for litigation.

[To be Continued]

★

Greetings

from the

Motion Picture Costumers

of the

West Coast Local No. 705 I. A. T. S. E.

TED ELLSWORTH

Business Representative

★

RCA Custom Tele-Receivers

Designed to blend harmoniously with the interior decoration of lounges, executive offices, restaurants and dining rooms, the "Clubman" television receiver has been introduced by RCA Victor in the Television Lounge of the Sherry-Netherland Hotel in New York City. Characterized as "television in good taste," the new custom unit is completely built-in and affords opportunity for inconspicuous installation, individually designed to match the rich decor of the luxurious interior.

This initial custom-built unit has a 15 x 20-inch screen, which is almost as large as a full-size newspaper page. The screen is mounted flush in the wall, as is the speaker, which is mounted to form an extension of the screen frame. The frame is hinged and the receiver controls are mounted behind it, out of sight. Designed so that the entire wall unit may be easily rolled out, maintenance is considerably simplified.

The unit features the RCA Victor "Eye-witness Picture Synchronizer," which keeps the image locked in focus despite electrical interference from elevators, refrigerators, fans or other sources. The Clubman is also equipped with a four-stage intermediate frequency amplifier for picture sensitivity and two stages of video amplification for reserve strengthening of weak picture signals. The tube complement includes an RCA kinescope, seven rectifier tubes and 40 RCA Preferred Type tubes.

Twentieth Century-Fox Finances

Consolidated net profit for the 39-week period ending September 27, 1947 was announced recently by Twentieth Century-Fox. Their published figure of over $10,600,000 shows a decrease of over $5½ million below last year's comparable figure.

After deductions for preferred stocks the amount was equivalent to $3.65 per share on outstanding common stock, in comparison with the $5.69 per share offered after the same period last year.

For the third quarter, also ending September 27, their net profit figure was a little over $2,200,000 as compared with $4,770,000 for the same quarter in 1946.

Gross income before taxes was $136,158,000. Last year for the same period the gross was $139,180,000. This indicates a 2.2 per cent decrease in gross profit and a 60 per cent decrease in net profit below last year's figures.

Save Time with the

ACE "CLEAR LITE" CUE MARKER

The film is placed, with the guide marks and pins, onto an illuminated base. The cover clamps it into position. A single knob is moved once, causing all scribers to mark perfect, clean, accurate circles to the specifications of The Academy of Motion Picture Arts and Sciences". Eliminate punching, scratching or mutilating of films.

Made of aluminum and plastic in smart design, with case-hardened scribers in oilite bearings. Illumination is supplied by a low voltage source, approved for booth use. Guaranteed.

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FILM SCRAPERS . REEL END ALARMS . CUE MARKERS . MAGAZINE DOOR STOPS

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Season's Greetings

from

LOCAL NO. 597

WACO TEXAS

Congratulations

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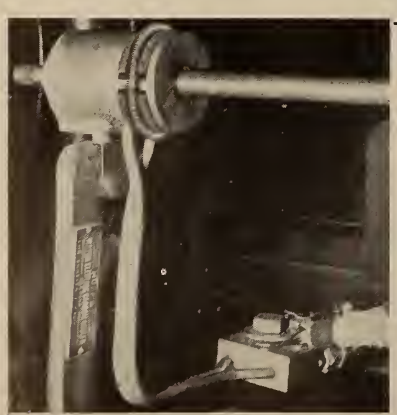
LOCAL NO. 396

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Holiday Greetings

LOCAL NO. 108

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Water electric

(positive carbon cooler)

for mirror arcs.

The answer to more light and whiter light and less heat at the film. (Note all of the features listed below.)

1. Gives a full crater filling the mirror with more light.
2. Eliminates carbon penciling.
3. Carbon heats only one-half inch behind crater.
4. Resistance remains constant regardless of length of trim.
5. Positive carbon constantly in line.
6. Gives more and wider light.
7. Greater coverage of the aperture.

Write us today for full information on the answer to your light problems.

HUFF'S MANUFACTURING CO., 659 W. Jefferson Blvd., Los Angeles 7, Calif.

TELECASTS

(*Continued from page* 20)

come large blots, long shots blur and there is difficulty in recognizing the cast. New lighting techniques must be used, distance shots avoided and the size and color of the average video screen must be kept constantly in mind during production if quality transmission is to be maintained.

Commenting further on video's effect on the motion picture industry, Fairbanks predicted the development of many new stars, directors, writers, technicians and producers, stating that the future will require a huge new industry, with Hollywood as the logical centre.

"Stations will require eight or nine hours of film per day," he pointed out, "based on the estimate that half of video programming will entail the use of film. This totals over 1000 times the amount of film being produced annually by any one major studio at the present time. When this is multiplied by the number of stations in only one city it necessitates a new, specialized industry.

"Five years after television hits its stride, there will be jobs for half a million people," he continued. "Ten years after it reaches complete commercialization, it will provide work for more than 4 million people." All of Hollywood's trade secrets: process shots, miniatures, slow motion or animation are either very difficult or impossible to duplicate in live telecasts, he stated. But they can be easily accomplished on film, add tremendous production value to any program and save money. "No sponsor," he concluded, "can afford the millions of dollars, and the months of time necessary to produce a hit film. Television will be no more harmful to the motion picture industry than the radio today."

IN THE SPOTLIGHT

(*Continued from page* 23)

president, and Sam Bowes, secretary-treasurer. Norman Taylor and Lorne Arnold replaced George Robinson and Solly Cohen as executive board members.

25 Years Ago—December 1922

• I. A. officials Charlie Shay, Frank Lemaster, Dick Green, Charlie Crickmore and Steve Newman on the West Coast surveying the situation there. . . . Organized labor opposed to President Harding's suggestion for a National Industrial Court. . . . The New York Times carried a statement attributed to B. W. Hooper, vice-chairman of the Federal Railroad Labor Board, and former governor of Tennessee saying "Unchecked unionism in the United States will eventually lead to bolshevism and death." (Mr. Hooper's mind reverts back to the dark ages, we think.). . . . Employment on the increase, according to statistics of the various State bureaus. . . .General Executive Board held its meeting at the International headquarters. . . . U. S. Supreme Court held that peaceful picketing was lawful.

You pay no more—often less

—for GENUINE Simplex PARTS

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NOW AVAILABLE FOR IMMEDIATE DELIVERY

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NATIONAL THEATRE SUPPLY

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National Theatre Supply congratulates the Altec Service Corporation on their tenth anniversary of service to the motion picture industry.

FOREST

The Only ELECTRONIC Carbon Arc Lamp

- Electronic Control
- Easy Maintenance
- No Fast Moving Parts
- Low-Cost Operation
- Electronic Timers
- Unit Construction
- Solenoid-Actuated Carbon Feed



Forest Electronic Company, Inc.

744 BROAD STREET, NEWARK, N. J.

New Lens Calibration System Developed

AN IMPROVED system for calibrating diaphragm openings of photographic lenses has been developed by Dr. Irvine C. Gardner of the National Bureau of Standards. This new method of marking apertures takes into account the losses of light from absorption, reflection and scattering within the lens, thus permitting more precise and accurate control of exposure light.

The method now in use is based entirely upon the ratio of the equivalent focal length of the lens to the diameter of the aperture. This ratio, known as the *f*-number, does not take into consideration the great differences in the useful light transmitted by various lenses. The introduction of reflection-reducing coatings has accentuated this performance variation to such an extent that for a given *f*-number the light transmitted by two lenses may differ by a factor of two.

In the new calibration method, the lens marking does not correspond to an aperture ratio such as 1:8, but rather to an opening large enough to permit the transmission of as much light as would be transmitted by a lens set at 1:8 aperture, *if there were no losses.* Such a system may be referred to as equivalent or compensated apertures. A standard designation for the new system has not yet been decided, but suggested terms are: effective *f*-number or *t*-number (*t*-transmission).

The usefulness of this method is evident from the following example. A lens of large relative aperture and no coating may have eight surfaces in which case the transmission may be as low as 66 per cent. Yet, a lens with low-reflection coatings and few surfaces, may transmit 98 per cent of the incident light. If exposures are made with the two lenses, for the same length of time, at the same *f*-number, the effective exposure will actually differ 50 per cent. However, if the diaphragms are marked according to the proposed system, the exposures will be identical. In the accompanying diagrams, the basic photometric principle of the system and its application in actual photography are shown.

Involving only a matching of two photometer readings, the new system is simple, direct and accurate. As each calibration is essentially a substitution procedure in which the two values of brightness are approximately the same, errors arising from non-linearity of response of the photometric apparatus are largely eliminated. The need for carefully calibrated filters is also avoided and a means is provided by which different laboratories may arrive at the same calibration values without the interchange of physical standards, since apertures in metal plates, the only standard required, can be readily constructed to the required sizes.

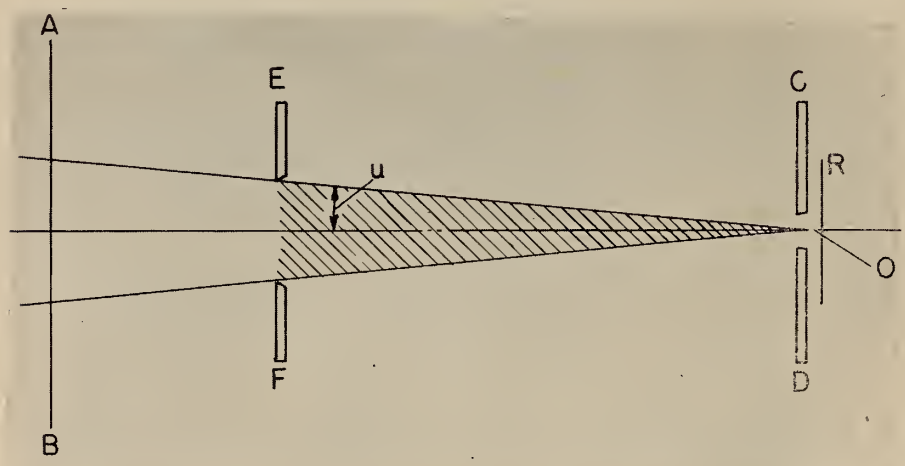


FIGURE 1. AB represents unifarmly bright surface; CD, a metal plate with small hole at O; EF, a second plate with larger opening. Shaded area indicates cone of light praceeding fram screen AB through bath apertures, falling upan phatocell receiver, R. If apening at EF is sa chasen that sine af half the angle af the shaded cane is ⅛, phatocell receives same light through apertures in both plates as if plate EF were remaved and an ideal lens with an *f*:4 aperture setting were substituted.

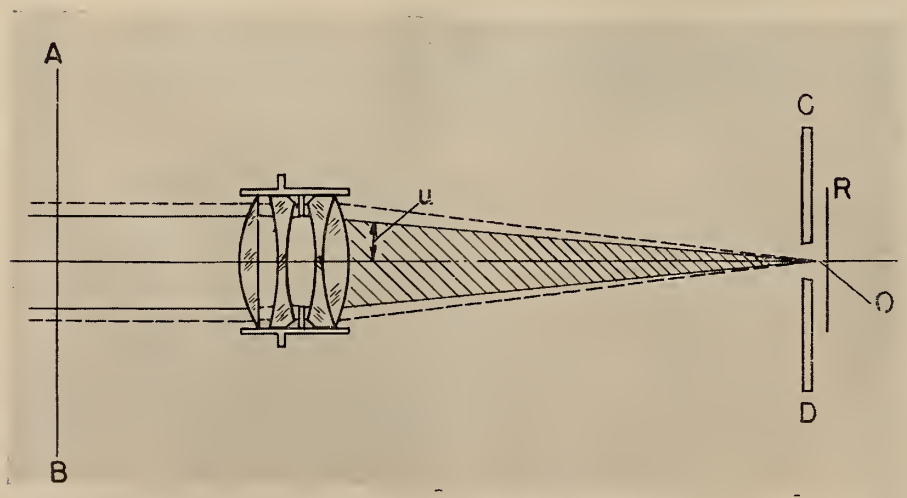


FIGURE 2. Plate EF (in Fig. 1) is substituted by *f*:4 lens, decreasing intensity of light because of absorptian, reflection and scattering. If iris diaphragm af lens is adjusted ta increase cone of light as indicated by dashes, the same photocell readings can be obtained as far the apening in the diagram shawn in Fig. 1. Lens setting then corresponds to a *t*-number of 4. Other values may be determined by varying the size of opening in plate EF.

PERSONNEL

H. KULHOW has been named vice-president in charge of manufacturing for Ampro Corp. of Chicago, Ill. Kulhow formerly was associated with General Precision Equipment Corp., which now controls Ampro.

* * *

SAMUEL E. EWING, JR., prominent Philadelphia lawyer has joined the legal department of RCA Victor. Ewing will supervise legal matters for the Engineering Products Department. Formerly a member of the law firm of Saul, Ewing, Remick and Saul, he is a graduate of Princeton University and Penn Law School. He rose from private to major while in service, on the staff of Gen. Omar Bradley.

* * *

JOHN K. WEST, formerly director of public relations for RCA Victor, has been appointed vice-president in charge of public relations. A native of Charleston, W. Va., he attended Wesleyan University and has been associated with RCA since 1930. Two of his "pet" projects have been the RCA exhibit at the Chicago World's Fair and the RCA Exhibition Hall at Radio City, N. Y. West was recently cited by the Navy Department for services in connection with the 1947 reserve recruiting campaign.

* * *

R. E. WARN, former managing director of Western Electric Company, Pty., Ltd. in Australia, has been named chief engineer of Westrex, succeeding G. S. APPLEGATE, recently deceased.

Warn, with Western Electric over 20 years, has been "down under" since 1936 as manager of the company's Australian and New Zealand subsidiaries. He will be replaced in Australia by W. S. TOWER, JR., former Westrex commercial manager, who has been supervising the company's Caribbean operations.

Merry Christmas
and a
Prosperous New Year
LOCAL NO. 548
Corsicana, Texas

Greetings!
from
LOCAL NO. 45
NEWBURGH, N. Y.

Best Wishes
from
LOCAL NO. 414
Wichita, Kans.

Greetings . . .
LOCAL NO. 360
Lufkin, Texas
Al Garrard,
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In this season of Good Fellowship and Good Cheer,
Our wish for you and yours is a brimming cup of Happiness, an overflowing measure of Joy, a heaping portion of Prosperity.

STRONG'S ZIPPER TRADEMARK CHANGEOVERS
ESSANNAY ELECTRIC MANUFACTURING CO. . . 1438 NORTH CLARK STREET, CHICAGO 10, ILLINOIS

Eastman Employes Get Wage Dividend

A record-breaking wage dividend of an estimated $11,650,000 for about 50,000 employes of Eastern Kodak in the western hemisphere was voted recently by the board of directors. The dividend, largest in the 36-year history of the plan at Kodak will be paid next March. Eligible employes will receive $22.50 for each $1000 earned during the period 1943-1947.

Employes who have been with Kodak five years by the end of 1947 will receive checks of about 5¾ times their average weekly wages during that period. This means that an employe averaging $3000 annual salary would get a dividend of $337.50 All who started work on or before October 1, 1947 and who are still employed at the end of this year will receive the dividend. Those who started work during this three-month period will receive the dividend if they are still employed on the date of payment, next March.

SMPE Leads New Recording Standards Committee

WORK is being started immediately to prepare standards resulting in better performance of disc and magnetic recordings used on home record players and in broadcast and motion picture studios. The work, as planned, will also include film sound track, stated the American Standards Association, sponsors of the committee, which has been formed under the leadership of the SMPE and IRE. Representatives of radio manufacturers, broadcasting systems and the Army and Navy Departments are cooperating.

Standard definitions of terms, methods for determining the quality of sound and standard dimensions to insure complete interchangeability and more satisfactory cooperation of automatic record changers are among the problems to be undertaken immediately.

Magnetic tape and wire recording are also under consideration; standards to be provided before dimensional differences in the magnetic material and in recording and playback equipment have been widely accepted. Other problems before the committee will be agreement on uniform definitions of technical terms and solution of the uneven volume level and sound distortion on disc recordings.

Chairman of the committee is George M. Nixon of NBC's engineering staff, assisted by John K. Hilliard of the Altec Lansing Corporation and SMPE as vice-chairman. Five technical subcommittees have been set up to correlate the work of existing organizations, consisting of representatives of the SMPE, RMA, NAB, IRE and ASA.

Greetings!
LOCAL NO. 10
I. A. T. S. E.
Buffalo, N. Y.

Best Wishes
from
LOCAL NO. 434
Peoria, Ill.

Season's Greetings
LOCAL NO. 315
Steubenville
Ohio

Holiday Greetings!
LOCAL NO. 249
I. A. T. S. E.
Dallas, Texas

Chemical in New Color Film Corrects Light Absorption

In an address before the American Chemical Society in Rochester, N. Y., Dr. Cyril J. Staud, director of the Kodak Research Laboratory, announced a new color film containing colored couplers which give automatic correction of undesired light absorption.

Speaking on some aspects of chemistry in color photography, Dr. Staud described a "coupler" as being a chemical which combines with other chemicals, producing a dye. Special types of such couplers will be incorporated in each of the light-sensitive layers in the new film, to be known as "Ektacolor."

Explaining the principle of correction, Dr. Staud stated that in the past, undesired light absorption was corrected by the formation of silver positive images which were exposed in register with the color negative. By the new chemical process, azo dyes giving proper absorption can be attached to couplers, and are eliminated during the coupling reaction.

"The result of this reaction," he continued, "is to destroy the inherent color of the coupler in the process. After color development, there are present in the emulsion layer a negative image of the coupler dye and a positive image of the remaining unreacted coupler."

He explained that this colored image serves to compensate for the unwanted absorption of the image dye and brings about automatic color correction.

SIX-PHASE MEANS NO FLICKER

Only "C&C" Offers You SIX-PHASE Full Wave Rectified Power
(Actually equivalent to 12-phase half wave)



MOTION PICTURE Theatres all over the U. S. and many Foreign Countries enjoy better projected light through rectified power from the new "C&C" SIX-PHASE Rectifiers. SIX-PHASE full wave rectification eliminates ripples and disturbing harmonics unavoidable in conventional three-phase rectifiers. The superiority of "C&C" SIX-PHASE rectifiers is universally recognized by experts in projection. This new development in motion picture projection is backed by over 15 years of research and engineering in the rectifier field.

With progressive theatre owners the "C&C" SIX-PHASE full wave rectifier is fast becoming standard equipment. For a more perfect light on your screen, investigate the "C&C" SIX-PHASE Rectifier.

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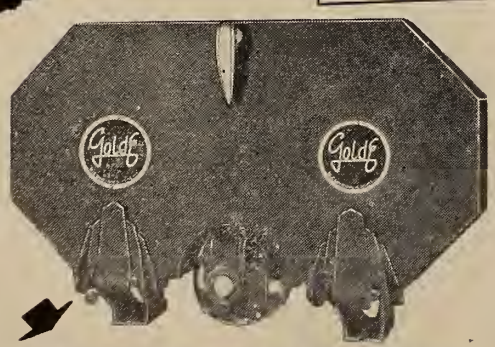
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New Selenium 6-Phase Unit Available Thru J. E. Robin

A wholly new application of the underlying principles of one of the oldest rectifying substances known to science, and the direct outgrowth of intensive research and practical application during the war, is embodied in a new selenium rectifier now ready for distribution. To be known as the Robin Selenium Rectifier, this new unit will be distributed by J. E. Robin, Inc., of New York City.

Selenium has a much higher reverse voltage rating, approximately four times that of other rectifier elements, states Emil A. Kern, president of J. E. Robin, who points out that this feature, where applied to requirements over six volts, requires fewer plates and has a greater safety factor. The use of a base plate of aluminum, continues Kern, materially reduces its weight, eliminates rusting, and facilitates radiation of heat.

The selenium rectifier is held to suffer less from aging than other dry-plate types. During this period, the first 10,000 hours of operation, the forward and reverse resistances increase gradually, after which they become stabilized. Compensation of from only 5 to at most 10% is required in the a.c. input voltage.

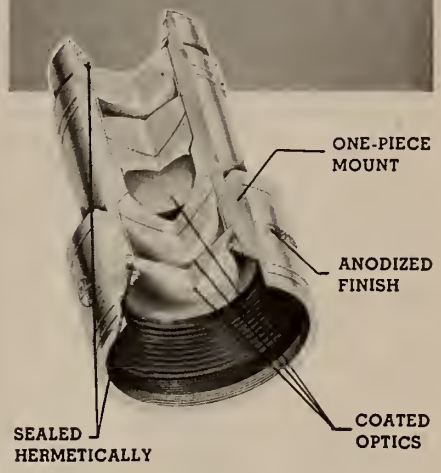
High Efficiency Rating

Placing the efficiency of the selenium rectifier as 85% when new, to 80%, when completely aged, Kern points out that selenium units have been in use for 15 years and more without deterioration. No warmup period is required, it being ready for instant use, it does not deteriorate on standby and the efficiency is uniformly high over a wide range of load, having an almost 100% power factor.

For 3-phase power lines this rectifier employs a transformer with a 3-phase primary and two sets of completely isolated secondary windings, cross-connected so as to deliver 6-phase power for full-wave rectification. Thus, the ripple frequency is calculated at 720 cycles per second.

The unit employs a specially designed mica and glass insulated transformer with completely isolated low-voltage secondaries. Of the high-reactance type, this transformer acts as a ballast to mini-

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SIX ELEMENTS ...
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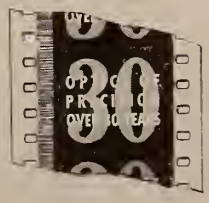
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This sturdy all-aluminum one-piece mounting can't loosen up or leak oil!

ANODIZED FINISH ...
The gleaming gold finish of the Super-Snaplite is an integral part of the aluminum ... it can't chip or flake off!

COATED OPTICS ...
Durable anti-reflection coating on each glass-to-air optical surface nearly *doubles* the light transmission ... gives brighter pictures, higher contrast!

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Exceptional speed for the utmost in screen brilliance without extra current consumption!

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The f/2.0 Snaplite Series II—hermetically sealed ... critical definition ... coated optics. For smaller theaters: the f/2.3 Snaplite Series I—coated optics optional. For complete details on all Snaplite lenses, get Bulletin 204 from your local supply dealer.



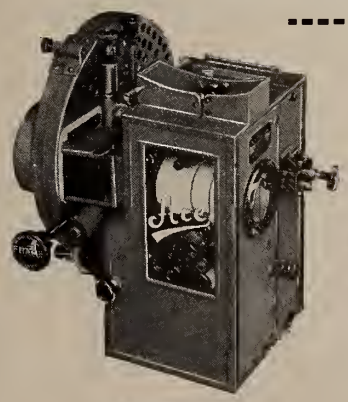
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mize fluctuations in arc current produced by changes in arc gap length and in the gas envelope around the arc. When the arc is struck this same reactance limits the short-circuit inrush current within safe bounds.

Primary taps are provided for line voltages from 190 to 240 a.c. Switching is provided for change in d.c. voltage in steps of 2 volts from 25 to 37 volts. Since there are no filaments, this combination of switching provides for any normal fluctuations in the power lines.

A remote control panel is provided which can be located in any convenient place in the projection room. With this panel the projectionist can start and stop either rectifier, or switch the same rectifier from one lamp to the other.

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MONTHLY CHAT

(*Continued from page* 3)

look for no further advances in this direction for quite some time to come. One has only to use the modern f:2 or f:1.9 projection lens to become acutely aware of the magnificent job turned in by the optical fellows.

On the television front, this department (and, we think, its readers too) are surfeited with the great gobs of material released to date relative to the iminency of *theatre* television. Home video is now entering a boom period, backed by a great merchandising campaign, but we see theatre tele no nearer to actuality than it was a year ago—or two years ago. True, a few theatres have installed experimental tele systems, but the problem of programming still has them licked.

One of the surprise developments of the past year was the apparently successful effort of Russian technicians in producing three-dimensional motion pictures. IP, no less than other observers, was at first constrained to accept such reports with the usual dash of salt, the Soviet being noted for its agility in propagandizing the "wonders" of every facet of Russian life and accomplishment. The reports of impartial, trained observers, however, cast this Russian achievement in a wholly different light.

Reports of the availability of world-wide rights to this Russian process make it certain that the leading American companies who are interested in this field will not long be without the know-how. This is all to the good for our film theatres.

Certain other developments bearing on film production and reproduction are cooking at the moment, but on such a slow fire as to not warrant that which would be only idle speculation at the moment. The film industry, unlike its status in 1926 before sound pictures were handed (?) to it full-blown, is no longer just a business of glamor, ballyhoo and false front. The lack of a sound scientific program nearly proved disastrous in 1926, and this time the business has both hands up ready to defend its position on the technological front.

In the setup of things motion picture, the projectionist still occupies a key position—one that will grow rather than diminish in importance. None of the developments of the past 20 years has shorn the craft of any of its prestige; rather have they enhanced the standing in the industry, and certainly they have emphasized the necessity for good craftsmanship and the continuing need to be alert and informed.

For its part, IP has sought to meet this requirement for an informed craft, and the record of the past 16 years would seem to indicate that it has discharged this function quite well. In turn, the craft itself has extended unswerving reader loyalty and support to IP, thus making possible the job that has been done. This happy circumstance of mutual respect makes it very easy to say with the best grace in the world, "A Merry Christmas and Happy 1948."

U. S. Releases German Sound Reproduction Techniques

Reports by British Technical Intelligence reviewing the recording industry in Germany have been recently declassified and are now available from the Office of Technical Services of the U. S. Department of Commerce. Of greatest interests are details of the Tefi sound recording and reproducing system and the Neuman damping recorder, it is said.

The Tefi system consists of recording on laterally-cut tracks on a flexible tape and reproducing by passing the tape under a needle held in a pickup. The Neuman damping recorder is an exceptionally simple and reliable device for the logarithmic recording of voltage values, being particularly suitable for electro-acoustic measurements. It is also used for determining voltage differences in sound frequency generators, such as microphones and receivers. Complete construction and operation instructions and schematics are included in the report.

Other reports, released at the same time, include one on a universal condenser microphone, believed to be the first single transducer, uni-directional microphone to be made and a report on filter designs for communications systems developed by the Siemens-Halske Laboratories.

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